MICROMEDIA

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COLLAR LOCATION AND WASTE /RECOVERABLE COAL THICKNESS

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COLLAR LOCATION AND WASTE /RECOVERABLE COAL THICKNESS

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INTRODUCTION

In partial fulfillment of the objectives of CANMET's Energy Research Program within the confines of the "Assessment of Coal Reserves and Production" project (code 430100), the Mine Evaluation Group assessed the coal resources of the Willow Bunch Coalfield in Saskatchewan. The first comprehensive evaluation exercise of the coalfields in Southern Saskatchewan was the 1978 cooperative study involving the Geological Survey of Canada, CANMET, the Department of Mineral Resources of Saskatchewan, and the Saskatchewan Reseach Council(2). The raw data which formed the basis of that assessment were gathered during the preceeding six years. A drilling program, designed for the study, collected 705 holes in 1972–1973 and an additional 1128 holes were gathered from various government and private industry sources. Several subsequent studies (3,4,5) were based on the computer-accessible files which were derived from the data that had been collected for the 1978 evaluation. Much information has been added to this file since 1978 and this study uses the more complete file for assessment purposes.

The present evaluation was undertaken by the Mine Evaluation Group at the request of CANMET'S Coal Research Laboratories. The major client involved in the study was the Saskatchewan Power Corporation . Redefined evaluation criteria for coal reserve and resource assessments in Saskatchwan resulted from the decisions at meetings of these three organizations. The new criteria are more restrictive than those which were used in earlier assessments, consequently, the estimated coal resources of the Willow Bunch Coalfield in this statement are less than those of previous reports.

Reserves of the Willow Bunch Coalfield have been assessed at 340 million tonnes of measured and 1456 million tonnes of indicated coal. The associated resources of inferred coal are 977 million tonnes. These reserves and resources are located in six (6) coal zones.

MATERIALS AND METHODS

Materials

Collection of quantitative data for the assessment of the Willow Bunch Coalfield began with a drilling campaign in 1972 and 1973. This sampling program covered the four coalfields in southern Saskatchwan (i.e. Estevan, Willow Bunch, Wood Mountain, and Cyprus). A total of 705 holes were drilled on the four zones during this initial phase of data compilation. Subsequently, 1128 holes were added to the Saskatchewan Coal Data Base (SASCO). The SASCO file was constructed by the Geological Survey of Canada using these 705 drillholes and an additional 1128 holes which were gathered from various government and private industry sources between 1973 and 1978. The 1978 federal-provincial evaluation utilized the complete SASCO file of 1833 holes.

The SASCO file was made computer-accessible and the 1978 and all subsequent evaluations of the coal reserves and resources of coalfields in Southern Saskatchewan have drawn on the data base.The file is continually being updated, consequently, this assessment is done using a significantly larger number of holes.

During the 1972-1973 sampling program 292 drillholes were completed in the Willow Bunch region. Another 600 holes were added to the file for the 1978 assessment. Since then 373 holes have been collected from various sources, mostly from the Poplar River Mine. Therefore, a total of 1265 drillholes comprise the data base on which the reserves and resources of Willow Bunch Coalfield are calculated.

The Mine Evaluation Group has restructured the SASCO file so that it is compatible with the computer programs developed by the group for reserve and resource evaluation. These modified computer data files and the programs which have been applied to them are described in reference 5.

The evaluation criteria, as described in detail in Appendix 2, which have been applied in the present assessment, were defined by a series of oral and written consultations between officials of the following organizations;

Saskatchewan Power Corporation,

EMR/CANMET Coal Research Laboratories,

EMR/CANMET Mine Evaluation Group.

The mineability restrictions for the Willow Bunch Coalfield are those that were

drawn up with the cooperation of Saskatchewan Power Corporation for the Estevan Coalfield and reflect current limiting mining criteria . These restrictions were forwarded to the Mine Evaluation Group in the form of a memo.

A set of 1:50,000 scale topographic maps covering N.T.S. sheet 72H were used as base maps for the present project.The 1:100,000 scale map generated from the digitization of these topographic maps combined with the mineability criteria , the drillhole information from the SASCO file,and the geological coal limits from GSC Report 30, permitted the Mine Evaluation Group to calculate the coal reserves and resources of the Willow Bunch Coalfield.

There are six coal zones in the Willow Bunch region containing recoverable coal reserves and inferred coal resources as defined by the evaluation criteria and mining restrictions appended to this report. From the stratigraphically highest zone to the lowest zone, the six zones are; (A) Willow Bunch, (B) Fremington, (C) Coronach, (D) Hart, (E) Fife Lake, and (F) Landscape. Each zone was examined separately and the block identifications in subsequent parts of this report refer to the resource category and the specified zone(i.e. MA– 01 refers to measured ore, Willow Bunch zone, block 1; ID– 01 refers to indicated ore, Hart zone, block 1; NE– 04 refers to inferred ore, Fife Lake zone, block 4, etc.).

Methods

Conventional resource evaluation methods were applied to the Willow Bunch data. The proceedure involved the following steps;

(1) Reserve and resource areas were outlined and measured with due regard for the more restrictive mining criteria,

(2) The thicknesses of recoverable coal seams were derived from drillhole information in the SASCO file,

(3) The volumes of coal blocks were calculated by multiplying the area measurements of step (1) by the thicknesses of step (2),

(4) The recoverable coal tonnages were obtained by multiplying these volumes by a specific gravity of 1.24. This is as good a value as was available to the Mine Evaluation Group at the time of the assessment.

The above sequence of evaluation steps is more fully amplified by the series of maps which accompany this report. The maps have been prepared to facilitate the implementation of the step by step procedure.

Geological coal limits (Map MPWB 84-1(a) to 84-1(f)).

The geological limits of coal in the six zones of the Willow Bunch Coalfield were previously outlined for the 1978 study of coal resouces in Southern Saskatchewan (1). The Mine Evaluation Group digitized the outlines of the individual zones from the maps in that report. The resultant six maps, at a scale of 1:100,000 , show all areas underlain by coal without regard for economical, technological, or legal considerations.

A composite map was produced to show all six zones, however, much confusion resulted from the great number of overcrossing lines. Therefore, this map does not accompany the present report. However, the file can be reactivated for future examination.

Non-mineable areas (Map MPWB 84-2)

Topographic maps, at a scale of 1:50,000 , based on air-photo coverage from 1970 to 1978 were digitized to outline non-mineable areas. Lakes, river valleys, municipal areas, regional parks, airports, railway lines, provincial highways, and power transmission lines are the features that have been digitized to produce the map of non-mineable areas, at a scale of 1:100,000.

Sampling information (Map MPWB 84-3)

As previously mentioned, the SASCO file contains 1285 drillholes for the Willow Bunch Coalfield. A surface plan showing the collar locations of all these holes has been drawn at the 1:100,000 scale.

Extent of areas underlain by coal

(Maps MPWB 84-4 to 84-9)

Maps 84-4 to 84-9 show the extent of recoverable coal for each of the zones in the Willow Bunch Coalfield without considering the mineability criteria or geological limits of the zones. A separate file has been created for each of the six coal zones. The zone of influence for indicated coal reserves was plotted around the collar of each drillhole that contained recoverable coal.

Areas underlain by recoverable reserves of coal (Maps MPWB 84-10 to 84-15)

The files that were created for the recoverable coal maps in the previous step were merged with the respective files containing the data on geological coal limits for each zone. The merged files were used to produce a series of maps which were overlain on the non-mineable areas map (84-2) and the areal extend of recoverable coal was determined. The areas underlain by recoverable coal were subdivided into blocks, and resource categories were assigned on the basis of the previously formulated criteria. The digitizer was used to ascertain the area of each block and to digitize the boundaries of the blocks thereby establishing a file from which maps MPWB 84-10 to 84-15 were drawn.

Collar location and waste/recoverable coal thickness (Maps MPWB 84-16 to 84-21)

To facilitate the determination of the ratio of waste thickness to recoverable coal thickness , an additional set of drillhole location maps was plotted to show these variables. A map has been produced for each of the six coal zones on which has been plotted the collar location for each hole with recoverable coal, the thickness of waste to the top of the coal zone in that hole, and the thickness of the recoverable coal. Both thicknesses are expressed in meters and are rounded to the nearest tenth of a meter. Because of the close spacing of the sampling points in the area of the Poplar River Mine the scale of the maps in this area was enlarged so that the waste and recoverable coal thicknesses are more easily read. These maps have the same numeric sequence as the 1:100,000 scale maps for the specific coal zone, but a letter has also been added (i.e. the main map for the Hart Zone is MPWB 84-18 and the 1:50,000 blow-up is MPWB 84-18(a) while the 1:10,000 scale map is MPWB 84-18(b)).

RESULTS

The recoverable coal reserves for the indivdual zones of the Willow Bunch Coalfields are summarized in Table 1 (a). Table 1 (b) summarizes the measured and indicated coal reserves and the associated inferred coal.

Table 2 gives a block by block distribution of these reserves for each of the zones. The areas of individual blocks, the thicknesses of recoverable coal seams, and the associated tonnages have been tabulated.

Coal zone overlaps in the Willow Bunch Coalfield occur in a restricted number of cases. There are six cases where zones overlap – in three cases the Coronach Zone overlies the Hart Zone and in another three cases the Fife Lake Zone is overlain by the Hart Zone. The total amount of recoverable coal in the the overlapping portions of the Willow Bunch Coalfield is summarized in Table 3. A detailed tabulation of the overlapping pairs is presented in Table 4. The resource categories involved were not segregated, however, the vast majority of the coal was in the measured category, and lesser amounts are present in the indicated and inferred categories. The Poplar River Mine reserves are predominant in the overlapping tonnages as is evident by the quantities shown in overlapping blocks C–05/D–05 and D–05/E–06.

As stated previously, the present exercise represents the second major assessment of the Willow Bunch Coalfield using quantitative data available from computer accessible files. Table 5 compares the 1978 evaluation with the figures obtained in the course of the present evaluation. The differences between the two exercises result from a more stringent application of the assessment criteria.

The appendices to this report contain the detailed results of stripping ratio estimation , the list of evaluation criteria and the average area of influence per drillhole. Tables 6 to 12 give waste/coal thickness ratios for each zone and resource block, while Tables 13 to 18 summarize the average area of influence per drillhole.

TABLE 1(a)
SUMMARY OF COAL RESERVES
WILLOW BUNCH COALFIELD

Coal Zone	Measured *(Million Tonnes)*	Indicated *(Million Tonnes)*	Total *(Million Tonnes)*
Willow Bunch	14.88	634.84	649.72
Fremington		47.99	47.99
Coronach	6.99	67.45	74.44
Hart	288.89	406.30	695.19
Fife Lake	29.25	91.14	120.39
Landscape		208.63	208.63
TOTAL:	340.02	1456.37	1796.39

TABLE 1(b)
SUMMARY OF COAL RESERVES AND RESOURCES
WILLOW BUNCH COALFIELD

Coal Zone	Measured *(Million Tonnes)*	Indicated *(Million Tonnes)*	Inferred *(Million Tonnes)*
Willow Bunch	14.88	634.84	30.12
Fremington		47.99	19.19
Coronach	6.99	67.45	31.77
Hart	288.89	406.30	515.35
Fife Lake	29.25	91.14	32.33
Landscape		208.63	348.07
TOTAL:	340.02	1456.37	976.85

TABLE 2
DETAILED RECOVERABLE COAL RESERVES
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Surface (Km^2)	Thickness *(meter)*	Tonnage *($\times 10^6$ Tonnes)*
MA-13	8.50	2.06	14.88
IA-01	60.50	2.36	121.36
IA-02	21.79	2.42	44.82
IA-03	25.03	2.57	54.67
IA-04	4.79	2.80	11.40
IA-05	4.30	0.30	1.09
IA-06	61.23	3.40	176.95
IA-07	49.81	2.68	113.46
IA-08	28.57	2.06	50.02
IA-09	1.56	0.60	0.79
IA-10	2.25	0.60	1.14
IA-11	1.93	1.20	1.96
IA-12	1.85	0.90	1.41
IA-14	18.85	2.43	38.93
IA-15	6.70	1.93	10.99
IA-16	3.55	0.90	2.71
IA-17	2.22	1.20	2.26
IA-18	4.73	0.20	0.80
NA-10	6.65	0.60	3.39
NA-11	6.93	1.20	7.06
NA-12	3.30	0.90	2.52
NA-15	6.33	1.93	10.38
NA-16	4.80	0.90	3.67
NA-17	2.52	1.20	2.57
NA-18	3.03	0.20	0.51

TABLE 2 cont'd
DETAILED RECOVERABLE COAL RESERVES
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Surface (Km^2)	Thickness (*meter*)	Tonnage ($\times 10^6$ *Tonnes*)
IB-01	3.49	0.30	0.89
IB-O2	1.98	0.60	1.00
IB-03	10.63	0.75	6.77
IB-04	14.61	1.10	13.66
IB-05	8.71	0.34	2.51
IB-06	11.22	0.92	8.77
IB-07	2.89	0.80	1.96
IB-08	17.07	0.68	9.86
IB-09	1.98	0.20	0.33
IB-10	1.56	0.70	0.92
IB-11	2.50	0.60	1.27
NB-01	16.75	0.30	4.27
NB-02	1.81	0.60	0.92
NB-07	4.15	0.80	2.82
NB-08	4.54	0.68	2.62
NB-09	2.38	0.20	0.40
NB-10	2.55	0.70	1.51
NB-11	13.00	0.60	6.63

Coronach Coal Zone

Surface Identification	Surface (Km^2)	Thickness (*meter*)	Tonnage ($\times 10^6$ *Tonnes*)
MC-05	13.49	0.61	6.99
IC-01	14.74	1.59	19.92
IC-02	7.61	0.40	2.58
IC-03	2.56	1.10	2.39
IC-04	9.53	0.92	7.45
IC-05	67.69	0.61	35.09
NC-02	17.96	0.40	6.10
NC-03	8.03	1.10	7.50
NC-04	23.22	0.92	18.15

TABLE 2 cont'd
DETAILED RECOVERABLE COAL RESERVES
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Surface (Km^2)	Thickness (*meter*)	Tonnage ($\times 10^6$ *Tonnes*)
MD-05	111.07	3.06	288.89
ID-01	16.42	1.52	21.21
ID-02	24.59	1.58	33.02
ID-03	2.56	2.10	4.56
ID-04	2.56	1.40	3.04
ID-05	103.65	3.06	269.59
ID-06	7.52	1.13	7.22
ID-07	44.53	1.63	61.69
ID-08	3.58	1.95	5.93
ND-01	27.99	1.52	36.16
ND-02	52.67	1.58	70.73
ND-03	12.02	2.10	21.45
ND-04	11.92	1.40	14.18
ND-05	108.03	3.06	280.98
ND-06	9.45	1.13	9.07
ND-07	49.15	1.63	68.09
ND-08	8.84	1.95	14.65

Fife Lake Coal Zone

Surface Identification	Surface (Km^2)	Thickness (*meter*)	Tonnage ($\times 10^6$ *Tonnes*)
ME-00	61.46	0.56	29.25
IE-01	18.76	0.39	6.21
IE-03	11.66	0.43	4.26
IE-04	2.50	0.30	0.63
IE-05	40.10	0.67	22.83
IE-06	120.14	0.56	57.18
NE-01	63.26	0.39	20.97
NE-03	26.69	0.43	9.75
NE-04	6.30	0.30	1.60

TABLE 2 cont'd

DETAILED RECOVERABLE COAL RESERVES

Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Surface (Km^2)	Thickness (*meter*)	Tonnage ($\times 10^6$ *Tonnes*)
IF-01	2.56	0.40	0.87
IF-02	7.28	3.30	20.42
IF-03	2.56	0.50	1.08
IF-04	10.24	0.78	6.78
IF-05	44.97	2.14	81.80
IF-06	10.24	0.45	3.91
IF-07	44.32	1.79	67.43
IF-08	25.17	1.23	26.31
NF-01	12.24	0.40	4.16
NF-02	23.88	3.30	66.98
NF-03	5.76	0.50	2.44
NF-04	79.11	0.78	52.44
NF-05	107.11	2.14	194.83
NF-06	71.11	0.45	27.19

TABLE 3

SUMMARY OF OVERLAPPING RECOVERABLE COAL RESERVES

Willow Bunch Coalfield

Overlaps of Coal Zones

	Upper Zone *(Million Tonnes)*	Lower Zone *(Million Tonnes)*	Difference *(Million Tonnes)*
Coronach/Hart	**71.93**	**282.30**	**210.37**
Hart/Fife Lake	**615.56**	**133.26**	**482.30**

TABLE 4

DETAILED RECOVERABLE COAL RESERVE OVERLAPS

Willow Bunch Coalfield

Coal Zones: Coronach/Hart

Surface Identification	Surface Area (Km^2)	Thickness Upper Zone *(Meters)*	Thickness Lower Zone *(Meters)*	Tonnage Upper Zone ($\times 10^6$ *Tonnes)*	Tonnage Lower Zone ($\times 10^6$ *Tonnes)*
C-02 D-01,D-02	25.57	0.40	1.55	8.69	33.69
C-04 D-07	27.04	0.92	1.63	21.15	37.46
C-05 D-05	81.18	0.61	3.06	42.09	211.15

Coal Zones: Hart/Fife Lake

Surface Identification	Surface Area (Km^2)	Thickness Upper Zone *(Meters)*	Thickness Lower Zone *(Meters)*	Tonnage Upper Zone ($\times 10^6$ *Tonnes)*	Tonnage Lower Zone ($\times 10^6$ *Tonnes)*
D-01,D-02 E-01,E-03	62.39	1.55	0.41	82.20	21.74
D-07 E-05	44.04	1.63	0.67	61.02	25.08
D-05 E-06	181.60	3.06	0.56	472.34	86.44

TABLE 5
COMPARISON OF THE PRESENT AND THE PREVIOUS COAL RESERVE/RESOURCE ESTIMATIONS
Willow Bunch Coalfield

Coal Zone	Estimation Sources	Resource Categories in Million Tonnes			
		Measured	Indicated	Total M&I	Inferred
Willow Bunch	GSC/1978	235.3	439.6	674.9	362.5
	MEG/1985	13.9	590.4	604.3	28.0
Fremington	GSC/1978	11.1	26.4	37.5	45.2
	MEG/1985		44.6	44.6	17.9
Coronach	GSC/1978	16.0	22.0	38.0	20.0
	MEG/1985	6.5	62.8	69.3	29.6
Hart	GSC/1978	403.1	346.7	749.8	487.2
	MEG/1985	268.7	377.9	649.6	479.3
Fife Lake	GSC/1978	8.9	10.8	19.7	19.1
	MEG/1985	27.2	84.7	111.9	30.0
Landscape	GSC/1978	74.5	198.6	273.1	485.9
	MEG/1985		194.0	194.0	323.7
All Zones	GSC 1978	748.7	1044.2	1792.9	1419.8
	MEG 1985	316.2	1354.5	1670.7	908.5
Difference	MEG85/GSC78	-432.5	+310.3	-122.2	-511.3

Notes:

1; GSC/78 from TABLE 12 REPORT 30 with metric conversion by D.F.W.

2; MEG/85 calculations by R.B. and D.F.W. from MEG data files

3; 7 % has been deducted for railway,transmission line and road allowances.

4; The Saskatchewan Power Corporation completed a report (6) on Lignite Resources of Saskatchewan in March 1984 and the total measured and indicated coal of immediate interest reported in that document was 1,792 million tonnes.

DISCUSSION

Dependable and precise results from a resource estimation are a function of the primary data base. In the case of the coal resources in the Willow Bunch Coalfield, this data base is the SASCO file, (i.e. the computerized drillhole samples of the coal seams in the area). Over much of the region covered by the present assessment the density of drilling appears sufficient to warrant categorization of the resources into the assigned measured, indicated, and inferred classes. The tables of area of influence per drillhole support this classification of resources. However, whether this amount of coal is actually present in the quantities quoted in this report is questionable for a number of reasons.

Although the density of drilling meets the specifications as defined for the measured, indicated, and inferred categories of coal resources in the Plains Region of Saskatchewan, there are a number of instances where continuity of the coal is suspect. This may be because the coal was not deposited in these areas, or that it has since been eroded, or the drillholes were not deep enough to intersect the coal zones in question.

In the early discussions between the various organizations involved in this assessment there was concern about the mineability of coal in areas of high relief. A number of these areas occur in the Willow Bunch region. However, due to the time constraint on preparation of the present report dependable detailed maps of these areas could not be developed.

The base maps for the project are derived from air-photo coverage that is in most cases 12 to 15 years old. This is the most recent information available to the Mine Evaluation Group, however, a number of more recent features— of interest in such a evaluation process— are not shown on the maps (eg. The Poplar River Mine which opened in 1981).

The sampling campaign, as described in reference 2, for the data base on which the entire exercise is based is of an exploratory nature, that is, the drillholes are widely spaced and the precision of the surveying data is uncertain. Page 91 of that report states, ' 'Elev uncertainty* for estimated elevations, the uncertainty is a contour interval. (in this case ± 25 feet). The uncertainty on surveyed holes is probably in the order of ±1 foot (± 0.3 m).".

Finally, the density factor which has been applied to the area measurements is not substaniated by representative sampling of the coal zones. In the 1982 report Sabourin and Boyle(5) state that the majority (60) of the 85 analysed coal samples are from north-west part of the Willow Bunch region and most of these are of the Hart zone.

CONCLUSIONS AND RECOMMENDATIONS

The shortcomings of the present evaluation exercise are outlined in the discussion. Some of these problems, notably sorting out areas of high relief and updating the base maps, can be solved without too much effort. Reconciliation of the density factor would require a considerable amount of additional analysis. The uncertainty of the drillhole locations could be resolved by surveying the collars for those holes which have not been surveyed. The actual number of holes that have not been properly surveyed should be determined before an expensive survey is undertaken. These problems should be resolved before further evaluations of coal reserves of the Willow Bunch Coalfield or the other coalfields of southern Saskatchewan are undertaken. Future estimations of reserves should be done using volumes thereby avoiding the problems of imprecise density factors.

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APPENDIX 1

STRIPPING RATIO ESTIMATION OF THE WILLOW BUNCH COALFIELD

Mining of coal in the Willow Bunch Coalfield will most probably be done by strip mining methods. In strip mining, as in any other surface mining technique, the ratio of the waste quantity to the quantity of underlying resource, in this case coal, is a primary factor of consideration in the decision-making process concerning the future of a mining project. This is the ***stripping ratio.***

Over a large area, where numerous mining projects could be envisaged the concept of the ***stripping ratio*** becomes somewhat clouded. According to individual preference one could interpret it as the ratio of the average waste thickness to the average coal thickness or the average of the waste/coal thickness ratios. The first is equivalent to the ***stripping ratio*** of a singular mining project because the ratio of the average of all sampled waste thicknesses to the average of all sampled coal thicknesses is equal to the ratio of the total estimated waste to the total estimated coal. In other words, it is a <u>ratio of averages</u>. The second is the average of all individual waste/coal thickness ratios, calculated at each sampling point. This latter is an <u>average ratio</u>. In the case of the Willow Bunch Coalfield the ratio of averages and average ratio were both calculated and these are tabulated in detail in Tables 6 to 12.

It is customary that some variables, distributed over a large area, be contoured on maps or plans to facilitate the overview of their behaviour. During the estimation of recoverable coal in the Willow Bunch Coalfield it was suggested to the Mine Evaluation Group that the ***stripping ratio*** over the Willow Bunch Coalfield should also be contoured, at least in areas where the density of the sampling permits. Unfortunately, the detailed investigation of the waste/coal thickness ratios disclosed that contouring them as ***stripping ratios*** is not possible for the following reasons:

From the above described two concepts which could be substituted for the ***stripping ratio*** of a singular mining project regionally,i.e.,the <u>ratio of averages</u> and the <u>average ratio</u>, the first is a singular,invariable value. Consequently it is not contourable. The second would be contourable only if the denominator of the individual waste/coal thickness ratios of all considered sampling points would be constant. In such a case the linear correlation coefficient "r" between the waste and coal thickness arrays would be zero. Such is not the case over the Willow Bunch Coalfield. Even if such would be the case the contours over the area would not be ***stripping ratio*** or waste/coal thickness ratio contours. Rather, they would be properly named as waste thickness contours because only the waste thickness measurements would be variable.

TABLE 6
SUMMARY OF WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coal Zone Surface Identification	Number of drillholes	Waste/Coal Ratio of Averages	Waste/Coal Average Ratio
Willow Bunch Zone			
MA-13	13	8.2	11.9
IA-01	27	7.6	12.5
IA-02	17	9.0	20.3
IA-03	23	7.4	30.9
IA-04	3	7.6	15.8
IA-05	2	44.5	44.5
IA-06	18	6.5	8.3
IA-07	18	11.7	15.3
IA-08	14	11.5	36.7
IA-09	1	23.2	23.2
IA-10	2	37.4	37.4
IA-11	1	12.4	12.4
IA-12	1	11.3	11.3
IA-14	13	6.7	9.7
IA-15	3	11.8	13.9
IA-16	2	15.3	16.9
IA-17	1	13.8	13.8
IA-18	2	111.5	112.2
NA-10	2	37.4	37.4
NA-11	1	12.4	12.4
NA-12	1	11.3	11.3
NA-15	3	11.8	13.9
NA-17	1	13.8	13.8
NA-18	2	111.5	112.2

TABLE 6 cont'd
SUMMARY OF WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coal Zone Surface Identification	Number of drillholes	Waste/Coal Ratio of Averages	Waste/Coal Average Ratio
Fremington Zone			
IB-01	2	73.5	73.5
IB-02	1	68.1	68.1
IB-03	4	61.5	67.3
IB-04	7	30.0	39.3
IB-05	5	87.8	87.9
IB-06	7	39.8	72.2
IB-07	2	29.4	29.8
IB-08	10	28.4	36.7
IB-09	1	112.5	112.5
IB-10	1	41.9	41.9
IB-11	1	12.9	12.9
NB-01	2	73.5	73.5
NB-02	1	68.1	68.1
NB-07	2	29.4	29.8
NB-08	10	28.4	36.7
NB-09	1	112.5	112.5
NB-10	1	41.9	41.9
NB-11	1	12.9	12.9
Coronach Zone			
MC-05	125	32.2	45.7
IC-01	7	21.5	22.4
IC-02	4	62.7	81.5
IC-03	1	41.7	41.7
IC-04	5	19.9	40.4
IC-05	125	32.2	45.7
NC-02	4	62.7	81.5
NC-03	1	41.7	41.7
NC-04	5	19.9	40.4

TABLE 6 cont'd
SUMMARY OF WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coal Zone Surface Identification	Number of drillholes	Waste/Coal Ratio of Averages	Waste/Coal Average Ratio
Hart Zone			
MD-05	502	8.3	10.6
ID-01	9	16.7	22.5
ID-02	10	22.9	42.5
ID-03	1	23.5	23.5
ID-04	1	35.2	35.2
ID-05	502	8.3	10.6
ID-06	3	22.4	26.1
ID-07	18	17.1	22.0
ID-08	2	18.8	20.0
ND-01	9	16.7	22.5
ND-02	10	22.9	42.5
ND-03	1	23.5	23.5
ND-04	1	35.2	35.2
ND-05	502	8.3	10.6
ND-06	3	22.4	26.1
ND-07	18	17.1	22.0
ND-08	2	18.8	20.0

TABLE 6 cont'd
SUMMARY OF WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coal Zone Surface Identification	Number of drillholes	Waste/Coal Ratio of Averages	Waste/Coal Average Ratio
Fife Lake Zone			
ME-06	130	62.0	79.2
IE-01	4	82.6	93.6
IE-03	4	98.1	127.8
IE-04	1	132.0	132.0
IE-05	16	56.6	56.6
IE-06	130	62.0	79.2
NE-01	4	82.6	93.6
NE-03	4	98.1	127.8
NE-04	1	132.0	132.0
Landscape Zone			
IF-01	1	61.7	61.7
IF-02	3	8.1	9.8
IF-03	1	106.8	106.8
IF-04	5	52.2	113.4
IF-05	17	14.3	41.1
IF-06	4	98.3	116.2
IF-07	17	22.0	51.5
IF-08	9	33.3	49.4
NF-01	1	61.7	61.7
NF-02	3	8.1	9.8
NF-04	5	52.2	113.4
NF-05	17	14.3	41.1
NF-06	4	98.3	116.2

TABLE 7
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MA-13	0288	23.2	1.5	15.8
MA-13	0365	25.4	1.8	13.9
MA-13	0366	28.1	1.6	17.7
MA-13	1510	13.2	3.4	3.9
MA-13	1511	21.7	2.7	7.9
MA-13	1512	22.3	2.4	9.2
MA-13	1513	9.2	2.4	3.8
MA-13	1514	17.8	3.1	5.8
MA-13	1515	7.4	3.3	2.2
MA-13	1516	14.7	2.1	6.9
MA-13	1517	9.5	1.5	6.2
MA-13	1518	10.4	0.3	33.7
MA-13	1519	16.2	0.6	27.0
TOTAL:	13	219.2	26.8	154.1

Ratio of Averages: 8.2

Average Ratio: 11.9

TABLE 7 contd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-01	0249	13.3	2.8	4.8
IA-01	0457	22.6	0.5	49.2
IA-01	0459	28.9	1.5	18.9
IA-01	0460	20.8	1.9	10.8
IA-01	0488	32.2	0.5	65.7
IA-01	1387	14.7	3.0	4.8
IA-01	1388	19.0	3.4	5.6
IA-01	1389	20.2	1.8	11.0
IA-01	1391	15.3	2.9	5.3
IA-01	1409	12.9	2.4	5.3
IA-01	1413	14.7	2.4	6.0
IA-01	1414	9.2	1.8	5.0
IA-01	1415	16.8	1.5	11.0
IA-01	1416	9.2	1.2	7.6
IA-01	1423	7.7	2.1	3.6
IA-01	1427	13.5	1.5	8.8
IA-01	1428	15.3	0.3	51.1
IA-01	1429	11.4	3.7	3.1
IA-01	1447	10.1	3.1	3.3
IA-01	1448	10.7	3.7	2.9
IA-01	1453	19.6	2.8	7.1
IA-01	1454	13.5	3.3	4.0
IA-01	1456	12.9	3.3	3.8
IA-01	1457	21.1	3.0	6.9
IA-01	1710	34.5	3.0	11.3
IA-01	1711	34.8	2.9	12.1
IA-01	1714	27.2	3.0	9.0
TOTAL:	27	482.2	63.6	338.2

Ratio of Averages: 7.6

Average Ratio: 12.5

TABLE 7
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-02	0405	27.8	3.2	8.6
IA-02	0407	37.1	1.4	25.8
IA-02	0458	22.9	0.3	76.5
IA-02	0466	30.2	3.3	9.2
IA-02	0467	27.1	3.3	8.2
IA-02	1324	6.2	0.6	10.0
IA-02	1330	43.0	0.3	138.9
IA-02	1364	19.9	3.7	5.4
IA-02	1424	19.9	3.1	6.5
IA-02	1425	15.9	4.3	3.7
IA-02	1426	10.7	2.1	5.0
IA-02	1436	11.7	0.9	12.7
IA-02	1438	20.5	3.3	6.1
IA-02	1439	25.1	3.0	8.2
IA-02	1440	14.7	2.1	6.9
IA-02	1441	21.7	3.0	7.1
IA-02	1446	17.5	3.0	5.7
TOTAL:	17	371.9	41.2	344.5

Ratio of Averages: 9.0

Average Ratio: 20.3

TABLE 7 con't
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-03	0408	25.8	0.5	56.2
IA-03	0419	23.7	3.9	6.1
IA-03	0422	32.1	0.2	200.5
IA-03	0436	18.8	4.0	4.7
IA-03	0439	24.8	4.8	5.1
IA-03	0462	8.7	3.5	2.5
IA-03	1009	28.6	2.6	11.0
IA-03	1333	27.8	0.2	146.4
IA-03	1372	10.1	1.4	7.3
IA-03	1374	33.3	3.4	9.9
IA-03	1375	14.7	0.9	16.2
IA-03	1376	10.7	3.4	3.2
IA-03	1377	8.0	3.7	2.2
IA-03	1378	8.3	3.4	2.5
IA-03	1382	8.9	3.7	2.4
IA-03	1398	16.8	2.4	6.9
IA-03	1399	7.4	1.8	4.0
IA-03	1400	5.9	2.7	2.1
IA-03	1421	8.9	0.5	19.4
IA-03	1715	29.0	0.2	181.4
IA-03	1716	26.7	3.8	6.9
IA-03	1717	27.6	4.0	6.9
IA-03	1718	27.6	4.0	6.9
TOTAL:	23	434.2	58.7	710.8

Ratio of Averages: 7.4

Average Ratio: 30.9

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-04	0316	17.1	0.5	35.7
IA-04	0418	29.4	4.8	6.1
IA-04	1334	16.6	3.0	5.6
TOTAL:	3	63.1	8.3	47.4

Ratio of Averages: 7.6

Average Ratio: 15.8

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-05	0435	8.3	0.3	26.6
IA-05	0494	19.3	0.3	62.2
TOTAL:	2	27.6	0.6	89.0

Ratio of Averages: 44.5

Average Ratio: 44.5

TABLE 7
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-06	0367	17.3	4.1	4.2
IA-06	0375	31.7	2.6	12.1
IA-06	0380	39.3	4.1	9.6
IA-06	0384	17.8	3.2	5.6
IA-06	0394	18.6	2.4	7.6
IA-06	0395	24.0	1.1	22.4
IA-06	0402	16.5	3.9	4.2
IA-06	0689	27.5	3.5	7.8
IA-06	0762	33.0	5.2	6.4
IA-06	1280	27.2	3.8	7.2
IA-06	1281	22.9	2.9	8.0
IA-06	1283	8.3	4.0	2.1
IA-06	1290	20.8	3.7	5.6
IA-06	1292	5.3	3.5	1.5
IA-06	1462	28.7	4.9	5.9
IA-06	1463	23.5	2.5	9.6
IA-06	1719	16.5	5.1	3.2
IA-06	1722	16.2	0.6	27.0
TOTAL:	18	395.2	61.1	150.0

Ratio of Averages: 6.5

Average Ratio: 8.3

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-07	0318	12.4	2.9	4.3
IA-07	0397	48.3	3.4	14.3
IA-07	0409	32.4	2.7	12.2
IA-07	0410	45.8	0.6	75.1
IA-07	0411	33.6	3.1	11.0
IA-07	1478	22.6	2.4	9.3
IA-07	1480	26.6	2.0	13.4
IA-07	1481	30.9	3.0	10.1
IA-07	1482	27.2	2.8	9.9
IA-07	1483	26.3	3.0	8.6
IA-07	1484	32.7	2.8	11.9
IA-07	1485	11.7	3.4	3.5
IA-07	1486	27.8	2.8	10.1
IA-07	1543	46.0	2.7	16.8
IA-07	1695	44.5	3.8	11.7
IA-07	1696	4.3	2.7	1.6
IA-07	1701	36.0	2.6	13.8
IA-07	1730	49.2	1.3	37.5
TOTAL:	18	558.3	47.9	275.0

Ratio of Averages: 11.7

Average Ratio: 15.3

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-08	0323	36.4	1.8	19.8
IA-08	0371	43.8	0.2	273.8
IA-08	0399	37.5	3.1	12.0
IA-08	0400	13.5	3.2	4.2
IA-08	0401	34.3	2.6	13.2
IA-08	0403	26.9	0.3	86.8
IA-08	0690	26.6	2.2	12.1
IA-08	0691	13.6	1.2	11.7
IA-08	1475	14.7	0.3	47.5
IA-08	1489	12.0	1.5	7.8
IA-08	1491	14.4	3.7	3.9
IA-08	1492	20.2	3.7	5.5
IA-08	1493	17.1	2.2	8.0
IA-08	1495	19.9	2.8	7.2
TOTAL:	14	330.8	28.7	513.4

Ratio of Averages: 11.5

Average Ratio: 36.7

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-09	0919	14.4	0.6	23.2
TOTAL:	1	14.4	6.0	23.2

Ratio of Averages: 23.2

Average Ratio: 23.2

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-10	0920	23.2	0.6	38.1
IA-10	1540	22.3	0.6	36.6
TOTAL:	2	45.6	1.2	74.7

Ratio of Averages: 37.4

Average Ratio: 37.4

WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-11	0915	15.0	1.2	12.4
TOTAL:	1	15.0	1.2	12.4

Ratio of Averages: 12.4

Average Ratio: 12.4

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-12	0916	10.4	0.9	11.3
TOTAL:	1	10.4	0.9	11.3

Ratio of Averages: 11.3

Average Ratio: 11.3

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-14	0088	19.8	1.1	18.5
IA-14	0360	12.3	0.3	39.6
IA-14	0361	22.8	2.6	8.7
IA-14	0362	16.9	3.1	5.5
IA-14	0363	19.5	3.0	6.5
IA-14	0364	6.5	0.6	11.3
IA-14	1520	30.9	4.3	7.2
IA-14	1521	4.0	1.5	2.6
IA-14	1522	7.4	2.8	2.7
IA-14	1523	30.6	3.7	8.3
IA-14	1527	4.0	0.6	6.6
IA-14	1531	18.1	3.4	5.4
IA-14	1533	17.1	4.6	3.7
TOTAL:	13	209.8	31.4	126.7

Ratio of Averages: 6.7

Average Ratio: 9.7

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-15	0333	23.5	1.6	14.5
IA-15	0338	24.1	1.2	20.1
IA-15	0906	21.7	3.0	7.1
TOTAL:	3	69.4	5.9	41.8

Ratio of Averages: 11.8

Average Ratio: 13.9

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-16	0334	7.7	0.4	19.7
IA-16	0685	19.1	1.4	14.1
TOTAL:	2	26.8	1.8	33.8

Ratio of Averages: 15.3

Average Ratio: 16.9

TABLE 7 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-17	0090	17.1	1.2	13.8
TOTAL:	1	17.1	1.2	13.8

Ratio of Averages: 13.8

Average Ratio: 13.8

Willow Bunch Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IA-18	0332	23.7	0.2	107.7
IA-18	0335	18.7	0.2	116.7
TOTAL:	2	42.4	0.4	224.4

Ratio of Averages: 111.5

Average Ratio: 112.2

TABLE 8
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-01	0319	12.0	0.3	38.6
IB-01	1355	33.6	0.3	108.4
TOTAL:	2	45.6	0.6	147.0

Ratio of Averages: 73.5

Average Ratio: 73.5

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-02	1320	41.5	0.6	68.1
TOTAL:	1	41.5	0.6	68.1

Ratio of Averages: 68.1

Average Ratio: 68.1

TABLE 8 con't
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-03	0408	46.0	0.6	83.6
IB-03	0437	41.1	0.5	89.3
IB-03	0679	44.1	0.9	46.4
IB-03	1302	46.1	0.9	50.1
TOTAL:	4	177.2	2.9	269.4

Ratio of Averages: 61.5

Average Ratio: 67.3

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-04	0370	22.4	0.3	65.9
IB-04	0478	27.3	1.3	20.7
IB-04	0489	49.2	1.7	28.7
IB-04	1293	41.2	1.7	24.0
IB-04	1297	24.8	1.4	17.9
IB-04	1298	47.3	1.0	45.5
IB-04	1299	22.3	0.3	72.0
TOTAL:	7	234.5	7.8	274.8

Ratio of Averages: 30.0

Average Ratio: 39.3

TABLE 8 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-05	0787	39.8	0.5	86.6
IB-05	0791	26.3	0.3	84.8
IB-05	0892	23.5	0.3	75.9
IB-05	1165	34.5	0.3	111.4
IB-05	1318	25.1	0.3	80.9
TOTAL:	5	149.3	1.7	439.6

Ratio of Averages: 87.8

Average Ratio: 87.9

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-06	0420	47.5	0.3	143.9
IB-06	0422	40.0	1.1	37.0
IB-06	0428	42.6	0.3	137.4
IB-06	0429	39.5	3.3	12.1
IB-06	0431	50.0	0.6	78.1
IB-06	1288	21.7	0.6	35.6
IB-06	1289	19.0	0.3	61.2
TOTAL:	7	260.2	6.5	505.3

Ratio of Averages: 39.8

Average Ratio: 72.2

TABLE 8 con't
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-07	0785	32.7	1.1	28.9
IB-07	1057	14.1	0.5	30.7
TOTAL:	2	46.4	1.6	59.6

Ratio of Averages: 29.4

Average Ratio: 29.8

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-08	0779	20.8	0.3	65.0
IB-08	0780	39.7	0.6	65.1
IB-08	0781	28.4	1.5	18.6
IB-08	0888	17.3	0.3	54.0
IB-08	0899	14.1	0.6	23.1
IB-08	1175	8.3	0.3	26.8
IB-08	1217	18.1	1.3	13.8
IB-08	1222	19.0	0.4	47.4
IB-08	1228	11.4	0.3	36.6
IB-08	1707	19.5	1.2	16.4
TOTAL:	10	196.5	6.9	366.7

Ratio of Averages: 28.4

Average Ratio: 36.7

TABLE 8 con'td
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-09	0311	21.4	0.2	112.5
TOTAL:	1	21.4	0.2	112.5

Ratio of Averages: 112.5

Average Ratio: 112.5

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-10	0455	31.0	0.7	41.9
TOTAL:	1	31.0	0.7	41.9

Ratio of Averages: 41.9

Average Ratio: 41.9

TABLE 8 con't
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fremington Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IB-11	0336	7.8	0.6	12.9
TOTAL:	1	7.8	0.6	12.9

Ratio of Averages: 12.9

Average Ratio: 12.9

TABLE 9
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coronach Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-01	0370	35.5	2.0	17.9
IC-01	0381	31.2	1.9	16.3
IC-01	0393	34.8	1.4	24.2
IC-01	1294	46.7	2.2	21.2
IC-01	1296	40.9	1.8	22.7
IC-01	1297	35.1	1.0	34.8
IC-01	1900	15.2	0.8	20.0
TOTAL:	7	239.4	11.1	157.1

Ratio of Averages: 21.5

Average Ratio: 22.4

TABLE 9
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coronach Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-02	0452	17.1	0.6	27.2
IC-02	0468	27.5	0.5	59.7
IC-02	0472	30.3	0.2	159.2
IC-02	0473	24.8	0.3	79.9
TOTAL:	4	99.6	1.6	326.0

Ratio of Averages: 62.7

Average Ratio: 81.5

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-03	1014	44.6	1.1	41.7
TOTAL:	1	44.6	1.1	41.7

Ratio of Averages: 41.7

Average Ratio: 41.7

TABLE 9
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coronach Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-04	0907	25.7	2.1	12.0
IC-04	1016	10.7	0.3	34.6
IC-04	1017	11.4	1.5	7.6
IC-04	1075	30.1	0.5	61.5
IC-04	1079	13.8	0.2	86.2
TOTAL:	5	91.7	4.6	201.9

Ratio of Averages: 19.9

Average Ratio: 40.4

TABLE 9 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coronach Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MC-05	0377	21.4	0.3	76.3
MC-05	0483	37.7	0.8	47.7
MC-05	0484	16.8	0.7	25.0
MC-05	0776	43.0	0.3	138.9
MC-05	0806	26.1	0.8	33.9
MC-05	0871	19.6	0.3	63.2
MC-05	0875	28.7	0.3	92.7
MC-05	0876	33.3	0.8	43.2
MC-05	0878	29.0	0.6	46.8
MC-05	0890	40.9	0.6	67.1
MC-05	0891	19.9	0.5	37.5
MC-05	0895	29.0	0.3	116.1
MC-05	1025	24.2	0.6	40.3
MC-05	1026	19.9	0.3	62.1
MC-05	1028	31.8	0.9	36.1
MC-05	1035	17.1	0.3	53.5
MC-05	1037	31.2	0.3	100.5
MC-05	1040	14.1	0.3	45.5
MC-05	1041	15.9	0.3	51.4
MC-05	1043	26.6	0.6	47.5
MC-05	1044	15.0	0.2	68.2
MC-05	1048	9.8	0.3	31.7
MC-05	1051	25.1	0.9	27.3
MC-05	1057	30.9	1.2	25.3
MC-05	1062	19.9	1.7	12.0
MC-05	1159	26.0	0.6	41.9
MC-05	1160	19.0	0.2	118.6
MC-05	1161	22.0	0.3	71.0
MC-05	1164	26.0	0.3	83.8
MC-05	1180	20.5	0.9	22.3
MC-05	1181	25.1	0.8	31.3
MC-05	1191	26.9	0.3	107.6
MC-05	1192	13.2	0.3	42.5
MC-05	1194	19.3	0.6	31.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MC-05	1200	11.7	0.3	37.6
MC-05	1201	14.1	0.3	45.5
MC-05	1206	6.5	0.9	7.6
MC-05	1213	22.6	0.6	37.1
MC-05	1214	14.1	0.3	45.5
MC-05	1222	29.6	1.6	18.3
MC-05	1224	23.2	0.5	44.7
MC-05	1232	11.7	0.3	37.6
MC-05	1233	18.1	0.6	29.6
MC-05	1234	32.1	0.3	103.5
MC-05	1235	22.3	0.3	72.0
MC-05	1239	31.5	1.8	17.2
MC-05	1240	27.2	0.3	87.7
MC-05	1244	28.1	0.3	90.7
MC-05	1245	19.3	0.6	31.6
MC-05	1313	30.6	0.3	101.9
MC-05	1558	19.9	0.3	62.1
MC-05	1706	19.6	0.3	63.2
MC-05	1731	19.6	0.6	30.6
MC-05	1744	16.1	1.3	12.6
MC-05	1745	29.4	0.6	50.6
MC-05	1746	21.7	0.2	90.5
MC-05	1750	18.7	1.1	17.4
MC-05	1762	11.7	0.6	19.1
MC-05	1767	19.3	0.3	64.3
MC-05	1768	26.0	1.0	25.0
MC-05	1769	19.3	0.9	21.0
MC-05	1772	14.4	0.6	23.2
MC-05	1773	24.5	0.9	27.5
MC-05	1776	27.5	0.9	32.0
MC-05	1777	9.8	0.3	31.7
MC-05	1841	17.1	0.9	18.4
MC-05	1843	15.0	1.7	8.9
MC-05	1846	9.2	0.9	10.0
MC-05	1847	15.8	0.6	25.9
MC-05	1848	8.3	1.2	6.7
MC-05	1853	17.1	0.9	18.4
MC-05	1854	5.9	0.3	18.9
MC-05	1858	16.5	0.6	27.1
MC-05	1867	11.1	0.6	18.1
MC-05	1868	18.1	0.3	58.3
MC-05	1869	13.5	0.9	14.7
MC-05	1870	16.8	0.9	18.3
MC-05	1891	16.2	0.3	52.4
MC-05	1893	18.7	0.6	30.6
MC-05	1899	13.2	2.0	6.6
MC-05	1900	15.2	0.8	20.0
MC-05	1912	12.3	0.3	39.6
MC-05	1913	17.5	0.6	28.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MC-05	1914	17.5	0.5	37.9
MC-05	1920	15.0	0.3	48.4
MC-05	1924	14.3	0.2	89.1
MC-05	1925	14.1	0.3	45.5
MC-05	1926	14.1	0.5	30.7
MC-05	1930	17.6	0.8	22.9
MC-05	1931	20.5	0.3	66.1
MC-05	1934	12.9	0.3	41.5
MC-05	1939	17.5	1.5	11.4
MC-05	1940	20.5	0.6	33.6
MC-05	1951	10.4	1.2	8.6
MC-05	1952	23.4	0.3	75.5
MC-05	1953	19.9	0.3	62.1
MC-05	1954	9.5	0.2	59.5
MC-05	1955	13.6	1.1	12.7
MC-05	1966	22.2	0.3	71.5
MC-05	1976	13.9	0.3	45.0
MC-05	1977	18.8	1.5	12.2
MC-05	1979	22.8	1.1	21.5
MC-05	2000	15.2	1.7	9.1
MC-05	2001	25.4	0.3	81.8
MC-05	2030	12.1	0.2	75.7
MC-05	2056	16.1	0.3	51.9
MC-05	2057	18.1	0.6	29.6
MC-05	2059	27.5	2.0	13.9
MC-05	2060	20.8	0.3	65.0
MC-05	2062	13.2	0.2	82.4
MC-05	2064	14.6	0.3	46.9
MC-05	2065	13.0	0.5	28.3
MC-05	2067	19.1	0.3	66.0
MC-05	2068	17.3	0.3	54.0
MC-05	2070	25.7	0.9	27.9
MC-05	2071	24.3	0.3	78.4
MC-05	2073	31.0	0.5	67.4
MC-05	2078	10.0	0.3	33.3
MC-05	2079	13.8	0.3	44.5
MC-05	2080	10.1	0.3	32.7
MC-05	2105	26.6	1.5	17.4
MC-05	2106	22.0	0.3	71 0
MC-05	2144	19.0	0.3	61.2
MC-05	2148	20.0	0.2	125.3
MC-05	2157	12.4	0.8	16.1
TOTAL:	125	2467.7	76.6	5716.4

Ratio of Averages: 32.2

Average Ratio: 45.7

TABLE 9 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Coronach Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-05	0377	21.4	0.3	76.3
IC-05	0483	37.7	0.8	47.7
IC-05	0484	16.8	0.7	25.0
IC-05	0776	43.0	0.3	138.9
IC-05	0806	26.1	0.8	33.9
IC-05	0871	19.6	0.3	63.2
IC-05	0875	28.7	0.3	92.7
IC-05	0876	33.3	0.8	43.2
IC-05	0878	29.0	0.6	46.8
IC-05	0890	40.9	0.6	67.1
IC-05	0891	19.9	0.5	37.5
IC-05	0895	29.0	0.3	116.1
IC-05	1025	24.2	0.6	40.3
IC-05	1026	19.9	0.3	62.1
IC-05	1028	31.8	0.9	36.1
IC-05	1035	17.1	0.3	53.5
IC-05	1037	31.2	0.3	100.5
IC-05	1040	14.1	0.3	45.5
IC-05	1041	15.9	0.3	51.4
IC-05	1043	26.6	0.6	47.5
IC-05	1044	15.0	0.2	68.2
IC-05	1048	9.8	0.3	31.7
IC-05	1051	25.1	0.9	27.3
IC-05	1057	30.9	1.2	25.3
IC-05	1062	19.9	1.7	12.0
IC-05	1159	26.0	0.6	41.9
IC-05	1160	19.0	0.2	118.6
IC-05	1161	22.0	0.3	71.0
IC-05	1164	26.0	0.3	83.8
IC-05	1180	20.5	0.9	22.3
IC-05	1181	25.1	0.8	31.3
IC-05	1191	26.9	0.3	107.6
IC-05	1192	13.2	0.3	42.5
IC-05	1194	19.3	0.6	31.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-05	1200	11.7	0.3	37.6
IC-05	1201	14.1	0.3	45.5
IC-05	1206	6.5	0.9	7.6
IC-05	1213	22.6	0.6	37.1
IC-05	1214	14.1	0.3	45.5
IC-05	1222	29.6	1.6	18.3
IC-05	1224	23.2	0.5	44.7
IC-05	1232	11.7	0.3	37.6
IC-05	1233	18.1	0.6	29.6
IC-05	1234	32.1	0.3	103.5
IC-05	1235	22.3	0.3	72.0
IC-05	1239	31.5	1.8	17.2
IC-05	1240	27.2	0.3	87.7
IC-05	1244	28.1	0.3	90.7
IC-05	1245	19.3	0.6	31.6
IC-05	1313	30.6	0.3	101.9
IC-05	1558	19.9	0.3	62.1
IC-05	1706	19.6	0.3	63.2
IC-05	1731	19.6	0.6	30.6
IC-05	1744	16.1	1.3	12.6
IC-05	1745	29.4	0.6	50.6
IC-05	1746	21.7	0.2	90.5
IC-05	1750	18.7	1.1	17.4
IC-05	1762	11.7	0.6	19.1
IC-05	1767	19.3	0.3	64.3
IC-05	1768	26.0	1.0	25.0
IC-05	1769	19.3	0.9	21.0
IC-05	1772	14.4	0.6	23.2
IC-05	1773	24.5	0.9	27.5
IC-05	1776	27.5	0.9	32.0
IC-05	1777	9.8	0.3	31.7
IC-05	1841	17.1	0.9	18.4
IC-05	1843	15.0	1.7	8.9
IC-05	1846	9.2	0.9	10.0
IC-05	1847	15.8	0.6	25.9
IC-05	1848	8.3	1.2	6.7
IC-05	1853	17.1	0.9	18.4
IC-05	1854	5.9	0.3	18.9
IC-05	1858	16.5	0.6	27.1
IC-05	1867	11.1	0.6	18.1
IC-05	1868	18.1	0.3	58.3
IC-05	1869	13.5	0.9	14.7
IC-05	1870	16.8	0.9	18.3
IC-05	1891	16.2	0.3	52.4
IC-05	1893	18.7	0.6	30.6
IC-05	1899	13.2	2.0	6.6
IC-05	1900	15.2	0.8	20.0
IC-05	1912	12.3	0.3	39.6
IC-05	1913	17.5	0.6	28.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IC-05	1914	17.5	0.5	37.9
IC-05	1920	15.0	0.3	48.4
IC-05	1924	14.3	0.2	89.1
IC-05	1925	14.1	0.3	45.5
IC-05	1926	14.1	0.5	30.7
IC-05	1930	17.6	0.8	22.9
IC-05	1931	20.5	0.3	66.1
IC-05	1934	12.9	0.3	41.5
IC-05	1939	17.5	1.5	11.4
IC-05	1940	20.5	0.6	33.6
IC-05	1951	10.4	1.2	8.6
IC-05	1952	23.4	0.3	75.5
IC-05	1953	19.9	0.3	62.1
IC-05	1954	9.5	0.2	59.5
IC-05	1955	13.6	1.1	12.7
IC-05	1966	22.2	0.3	71.5
IC-05	1976	13.9	0.3	45.0
IC-05	1977	18.8	1.5	12.2
IC-05	1979	22.8	1.1	21.5
IC-05	2000	15.2	1.7	9.1
IC-05	2001	25.4	0.3	81.8
IC-05	2030	12.1	0.2	75.7
IC-05	2056	16.1	0.3	51.9
IC-05	2057	18.1	0.6	29.6
IC-05	2059	27.5	2.0	13.9
IC-05	2060	20.8	0.3	65.0
IC-05	2062	13.2	0.2	82.4
IC-05	2064	14.6	0.3	46.9
IC-05	2065	13.0	0.5	28.3
IC-05	2067	19.1	0.3	66.0
IC-05	2068	17.3	0.3	54.0
IC-05	2070	25.7	0.9	27.9
IC-05	2071	24.3	0.3	78.4
IC-05	2073	31.0	0.5	67.4
IC-05	2078	10.0	0.3	33.3
IC-05	2079	13.8	0.3	44.5
IC-05	2080	10.1	0.3	32.7
IC-05	2105	26.6	1.5	17.4
IC-05	2106	22.0	0.3	71.0
IC-05	2144	19.0	0.3	61.2
IC-05	2148	20.0	0.2	125.3
IC-05	2157	12.4	0.8	16.1
TOTAL:	125	2467.7	76.6	5716.4

Ratio of Averages: 32.2

Average Ratio: 45.7

TABLE 10
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-01	0312	13.8	0.5	30.0
ID-01	0444	20.4	1.4	14.3
ID-01	0452	25.7	0.5	55.8
ID-01	0492	18.8	0.8	24.7
ID-01	0536	12.9	2.3	5.6
ID-01	0538	31.6	3.0	10.7
ID-01	0540	36.3	1.3	28.8
ID-01	0541	45.7	2.2	21.1
ID-01	0542	19.8	1.7	11.6
TOTAL:	9	225.0	13.5	202.7

Ratio of Averages: 16.7

Average Ratio: 22.5

TABLE 10 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-02	0311	45.5	2.1	21.9
ID-02	0463	39.1	0.6	64.1
ID-02	0464	22.8	2.1	10.6
ID-02	0465	18.2	1.5	11.9
ID-02	0468	42.7	1.2	35.0
ID-02	0469	46.1	2.0	23.2
ID-02	0470	39.0	1.4	28.9
ID-02	0471	31.5	0.2	196.7
ID-02	0472	40.0	2.1	18.7
ID-02	0473	37.3	2.6	14.3
TOTAL:	10	362.1	15.8	425.3

Ratio of Averages: 22.9

Average Ratio: 42.5

TABLE 10 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-03	0373	48.4	2.1	23.5
TOTAL:	1	48.4	2.1	23.5

Ratio of Averages: 23.5

Average Ratio: 23.5

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-04	0683	48.6	1.4	35.2
TOTAL:	1	48.6	1.4	35.2

Ratio of Averages: 35.2

Average Ratio: 35.2

TABLE 10
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	0377	31.8	1.8	17.9
MD-05	0379	35.9	2.2	16.1
MD-05	0386	48.3	1.7	28.8
MD-05	0414	47.3	2.2	21.5
MD-05	0483	45.0	0.9	48.3
MD-05	0484	29.9	4.4	6.8
MD-05	0775	28.7	3.4	8.5
MD-05	0776	48.8	4.3	11.4
MD-05	0777	37.9	3.7	10.3
MD-05	0778	36.6	3.7	10.0
MD-05	0788	26.8	3.9	6.8
MD-05	0789	25.1	1.3	18.7
MD-05	0790	18.7	4.3	4.3
MD-05	0792	18.5	1.0	18.9
MD-05	0794	23.9	2.5	9.5
MD-05	0795	13.8	4.1	3.3
MD-05	0796	14.4	0.3	46.5
MD-05	0797	19.2	3.2	6.1
MD-05	0798	31.5	2.4	13.0
MD-05	0800	21.1	3.9	5.4
MD-05	0802	35.4	1.4	25.1
MD-05	0803	12.6	0.9	14.1
MD-05	0805	18.7	2.7	7.0
MD-05	0806	37.6	2.3	16.4
MD-05	0807	25.0	1.2	20.5
MD-05	0808	26.9	0.6	42.0
MD-05	0809	24.1	3.7	6.5
MD-05	0812	21.7	0.9	23.9
MD-05	0816	26.0	4.0	6.5
MD-05	0817	35.9	2.3	15.7
MD-05	0818	18.1	0.6	29.6
MD-05	0820	34.5	2.1	16.2
MD-05	0852	26.9	0.6	44.1
MD-05	0868	21.1	2.8	7.6
MD-05	0869	17.5	3.3	5.4
MD-05	0870	18.7	3.5	5.3
MD-05	0871	33.6	3.4	9.9
MD-05	0872	31.1	3.4	9.2
MD-05	0873	25.1	1.5	16.4
MD-05	0875	34.2	4.4	7.8
MD-05	0876	40.9	3.2	12.9
MD-05	0878	37.4	3.2	11.8

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	0880	19.6	4.2	4.7
MD-05	0881	23.5	3.6	6.6
MD-05	0882	24.5	0.3	78.9
MD-05	0883	25.4	4.2	6.1
MD-05	0886	34.8	3.8	9.1
MD-05	0887	16.2	4.2	3.9
MD-05	0888	38.5	2.9	13.1
MD-05	0889	24.1	0.6	39.0
MD-05	0890	46.1	4.0	11.6
MD-05	0891	23.9	4.5	5.3
MD-05	0893	47.0	3.7	12.8
MD-05	0894	38.8	3.7	10.4
MD-05	0895	40.9	4.0	10.2
MD-05	0897	17.9	3.6	5.0
MD-05	0898	21.6	3.2	6.8
MD-05	0899	43.4	2.7	16.2
MD-05	1023	23.2	1.7	13.9
MD-05	1024	29.0	3.0	9.5
MD-05	1025	34.8	4.0	8.7
MD-05	1026	33.9	2.3	15.1
MD-05	1027	29.6	2.8	10.6
MD-05	1028	44.9	2.4	18.6
MD-05	1031	30.9	4.0	7.7
MD-05	1033	31.8	3.4	9.3
MD-05	1034	27.6	3.7	7.5
MD-05	1035	22.9	3.7	6.2
MD-05	1037	36.0	4.1	8.9
MD-05	1038	31.8	4.3	7.4
MD-05	1039	38.8	3.9	9.8
MD-05	1040	18.4	4.1	4.5
MD-05	1041	25.7	4.2	6.1
MD-05	1042	39.8	1.3	31.1
MD-05	1043	37.9	2.8	13.5
MD-05	1044	26.0	1.7	15.2
MD-05	1045	31.5	1.5	20.3
MD-05	1046	28.4	2.1	13.3
MD-05	1047	37.9	2.8	13.5
MD-05	1048	27.7	3.3	8.5
MD-05	1049	41.2	2.8	15.0
MD-05	1050	24.9	3.3	7.4
MD-05	1051	41.6	3.5	12.1
MD-05	1052	31.2	1.7	18.8
MD-05	1053	19.3	3.9	4.9
MD-05	1054	32.3	3.3	9.6
MD-05	1055	32.1	3.1	10.3
MD-05	1056	34.5	3.4	10.3
MD-05	1057	43.0	3.0	14.5
MD-05	1059	28.1	2.1	13.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1060	48.5	1.7	28.4
MD-05	1061	34.5	0.7	51.4
MD-05	1062	32.4	3.1	10.4
MD-05	1159	43.9	2.4	18.4
MD-05	1160	36.7	4.2	8.7
MD-05	1161	34.3	3.9	8.9
MD-05	1162	37.3	0.8	46.0
MD-05	1163	28.9	3.7	7.8
MD-05	1164	43.0	4.1	10.6
MD-05	1166	23.9	4.6	5.2
MD-05	1167	22.6	4.8	4.7
MD-05	1168	25.4	4.1	6.2
MD-05	1169	22.6	4.6	4.9
MD-05	1170	42.8	2.4	18.0
MD-05	1171	47.9	3.5	13.9
MD-05	1172	34.2	2.0	16.9
MD-05	1173	29.6	0.4	68.9
MD-05	1174	34.5	2.6	13.2
MD-05	1175	41.2	1.6	25.3
MD-05	1177	25.4	3.2	7.8
MD-05	1178	25.4	4.0	6.4
MD-05	1180	30.9	3.8	8.2
MD-05	1181	43.2	3.6	12.1
MD-05	1182	14.7	3.1	4.8
MD-05	1183	24.5	3.7	6.6
MD-05	1184	26.6	3.7	7.1
MD-05	1185	35.7	2.8	12.7
MD-05	1187	38.5	3.9	9.8
MD-05	1188	22.3	3.2	6.9
MD-05	1189	15.9	2.3	7.0
MD-05	1190	30.4	2.4	12.5
MD-05	1191	41.8	3.1	13.4
MD-05	1192	18.1	1.6	10.9
MD-05	1193	30.1	2.3	13.0
MD-05	1194	34.2	3.5	9.9
MD-05	1195	18.1	0.4	40.1
MD-05	1196	29.6	2.9	10.3
MD-05	1197	34.8	4.3	8.2
MD-05	1198	19.3	2.7	7.2
MD-05	1199	25.2	2.3	10.8
MD-05	1200	22.9	3.0	7.7
MD-05	1201	23.0	3.0	7.5
MD-05	1202	21.7	4.0	5.4
MD-05	1204	22.3	3.7	6.1
MD-05	1206	19.3	3.9	5.0
MD-05	1207	17.9	3.0	6.0
MD-05	1209	23.0	3.2	7.3
MD-05	1210	32.2	3.2	10.2

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1213	28.4	1.6	17.2
MD-05	1214	29.0	0.8	35.0
MD-05	1215	32.7	1.1	28.4
MD-05	1217	39.7	1.7	23.2
MD-05	1218	22.9	3.8	6.0
MD-05	1219	28.4	4.5	6.3
MD-05	1220	9.5	3.2	3.0
MD-05	1221	24.1	3.3	7.3
MD-05	1222	44.6	4.0	11.3
MD-05	1224	28.4	3.9	7.3
MD-05	1227	42.8	2.0	21.3
MD-05	1228	40.9	3.1	13.0
MD-05	1231	29.6	3.8	7.8
MD-05	1232	28.1	3.9	7.3
MD-05	1233	31.5	4.4	7.1
MD-05	1234	42.5	3.3	12.7
MD-05	1235	30.9	3.8	8.2
MD-05	1236	32.9	4.2	7.9
MD-05	1237	44.4	2.8	16.0
MD-05	1238	23.5	5.0	4.7
MD-05	1239	38.2	2.2	17.4
MD-05	1240	50.4	0.3	162.5
MD-05	1241	25.1	0.3	80.9
MD-05	1242	21.4	2.2	9.7
MD-05	1243	27.8	0.3	89.7
MD-05	1244	41.2	4.3	9.5
MD-05	1245	35.1	1.8	19.3
MD-05	1248	33.3	2.2	14.9
MD-05	1306	44.9	2.8	16.3
MD-05	1307	42.4	3.1	13.9
MD-05	1310	38.1	2.2	17.3
MD-05	1313	36.3	3.8	9.5
MD-05	1314	19.6	1.2	16.1
MD-05	1316	26.3	1.2	21.5
MD-05	1317	30.9	0.6	50.6
MD-05	1557	29.7	4.0	7.4
MD-05	1558	40.6	2.4	16.7
MD-05	1590	32.1	3.4	9.5
MD-05	1692	27.8	1.7	16.0
MD-05	1703	30.0	1.6	18.8
MD-05	1706	35.4	2.0	17.9
MD-05	1707	44.3	1.5	30.1
MD-05	1708	37.9	2.5	14.9
MD-05	1731	35.9	3.0	12.1
MD-05	1732	26.0	2.7	9.7
MD-05	1733	26.8	2.9	9.4
MD-05	1734	18.6	2.8	6.8
MD-05	1735	29.1	3.2	9.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1736	11.7	3.0	3.9
MD-05	1737	12.9	3.8	3.4
MD-05	1738	28.6	3.3	8.8
MD-05	1739	14.8	2.4	6.2
MD-05	1740	23.6	3.3	7.0
MD-05	1741	24.3	3.4	7.1
MD-05	1742	22.5	3.4	6.7
MD-05	1743	21.4	2.1	10.0
MD-05	1744	28.1	1.9	14.6
MD-05	1745	39.7	3.0	13.3
MD-05	1746	38.1	3.7	10.2
MD-05	1747	19.4	3.2	6.0
MD-05	1748	22.6	3.2	7.0
MD-05	1749	11.4	3.0	3.7
MD-05	1750	35.0	4.0	8.9
MD-05	1751	12.6	3.2	4.0
MD-05	1752	25.4	3.6	7.0
MD-05	1753	18.7	3.3	5.7
MD-05	1754	33.6	3.8	8.8
MD-05	1755	25.4	3.5	7.4
MD-05	1756	18.2	3.4	5.4
MD-05	1757	35.2	3.3	10.6
MD-05	1758	18.7	3.9	4.8
MD-05	1759	17.5	3.7	4.8
MD-05	1760	20.9	3.0	7.0
MD-05	1761	15.0	3.2	4.7
MD-05	1762	21.8	2.3	9.7
MD-05	1763	17.6	2.7	6.5
MD-05	1764	19.2	3.1	6.2
MD-05	1765	19.7	2.9	6.7
MD-05	1766	22.4	3.3	6.7
MD-05	1767	32.7	3.4	9.6
MD-05	1768	41.9	3.3	12.8
MD-05	1769	34.7	3.3	10.6
MD-05	1770	30.1	3.4	8.9
MD-05	1771	28.0	3.6	7.8
MD-05	1772	27.4	3.4	8.1
MD-05	1773	43.8	3.8	11.7
MD-05	1774	14.7	3.1	4.7
MD-05	1775	16.5	0.7	23.3
MD-05	1776	44.0	3.8	11.7
MD-05	1777	21.6	2.8	7.7
MD-05	1778	27.7	3.7	7.4
MD-05	1779	10.7	3.2	3.4
MD-05	1780	22.0	3.5	6.4
MD-05	1781	13.5	3.3	4.1
MD-05	1782	13.5	3.4	4.0
MD-05	1783	13.2	3.4	3.9

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1784	27.5	3.5	7.8
MD-05	1785	25.1	3.5	7.2
MD-05	1786	24.8	3.4	7.4
MD-05	1787	21.4	3.5	6.2
MD-05	1788	16.2	3.7	4.4
MD-05	1789	12.6	3.8	3.3
MD-05	1790	19.9	2.8	7.0
MD-05	1791	22.9	3.5	6.6
MD-05	1792	17.5	4.0	4.3
MD-05	1793	13.8	5.3	2.6
MD-05	1794	18.1	0.3	53.1
MD-05	1795	19.0	3.8	4.9
MD-05	1796	24.3	3.1	7.7
MD-05	1797	22.0	4.3	5.2
MD-05	1798	16.5	3.2	5.1
MD-05	1799	19.0	3.1	6.2
MD-05	1800	23.8	3.3	7.1
MD-05	1801	18.4	3.0	6.1
MD-05	1839	21.1	3.7	5.8
MD-05	1840	16.2	2.9	5.6
MD-05	1841	22.0	4.3	5.2
MD-05	1842	28.1	4.0	7.1
MD-05	1843	31.5	2.8	11.4
MD-05	1844	15.0	3.4	4.5
MD-05	1845	15.5	2.4	6.3
MD-05	1846	17.5	4.0	4.4
MD-05	1847	28.4	3.4	8.5
MD-05	1848	20.8	3.7	5.7
MD-05	1849	10.4	2.6	4.0
MD-05	1850	12.6	3.0	4.1
MD-05	1851	12.7	3.1	4.2
MD-05	1852	12.3	3.3	3.7
MD-05	1853	31.5	3.0	10.3
MD-05	1854	16.5	4.0	4.2
MD-05	1855	20.8	3.1	6.8
MD-05	1856	22.6	4.3	5.3
MD-05	1857	23.1	2.3	10.1
MD-05	1858	24.1	4.3	5.6
MD-05	1859	15.6	4.3	3.7
MD-05	1860	13.2	3.4	3.9
MD-05	1861	15.5	2.9	5.3
MD-05	1862	10.1	2.3	4.4
MD-05	1863	13.2	1.2	10.7
MD-05	1864	8.9	3.1	2.9
MD-05	1866	26.8	2.4	11.0
MD-05	1867	23.9	2.4	9.8
MD-05	1868	28.1	3.7	7.7
MD-05	1869	24.1	3.7	6.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1870	32.4	3.1	10.6
MD-05	1871	19.9	3.4	5.9
MD-05	1874	14.7	3.5	4.2
MD-05	1875	11.1	3.7	3.0
MD-05	1883	14.7	3.3	4.4
MD-05	1884	15.6	2.1	7.3
MD-05	1885	15.3	1.2	12.6
MD-05	1886	13.2	0.9	14.3
MD-05	1887	11.4	1.5	7.4
MD-05	1888	13.5	0.6	22.1
MD-05	1889	12.6	2.5	5.1
MD-05	1891	22.3	3.3	6.7
MD-05	1892	26.9	3.7	7.3
MD-05	1893	28.4	3.4	8.5
MD-05	1898	10.4	3.0	3.4
MD-05	1899	25.5	3.5	7.3
MD-05	1900	23.9	3.7	6.5
MD-05	1901	23.7	3.8	6.2
MD-05	1902	17.5	3.7	4.8
MD-05	1903	17.8	3.8	4.6
MD-05	1904	11.4	2.1	5.3
MD-05	1905	12.6	2.8	4.6
MD-05	1906	13.8	2.1	6.4
MD-05	1907	14.7	2.4	6.0
MD-05	1909	16.8	2.1	7.9
MD-05	1910	33.1	4.4	7.5
MD-05	1911	14.1	4.4	3.2
MD-05	1912	26.6	3.4	7.9
MD-05	1913	26.6	3.7	7.2
MD-05	1914	26.0	3.1	8.5
MD-05	1915	19.0	4.0	4.8
MD-05	1916	22.0	4.0	5.5
MD-05	1917	14.4	3.4	4.3
MD-05	1918	18.1	4.3	4.2
MD-05	1919	22.6	4.0	5.7
MD-05	1920	26.3	2.7	9.6
MD-05	1921	16.5	2.9	5.7
MD-05	1922	17.1	2.9	5.9
MD-05	1923	18.4	3.1	6.0
MD-05	1924	26.3	2.4	10.8
MD-05	1925	23.7	2.9	8.2
MD-05	1926	24.5	3.5	7.0
MD-05	1927	24.5	4.0	6.2
MD-05	1928	27.4	2.9	9.4
MD-05	1929	25.1	3.4	7.5
MD-05	1930	28.1	3.7	7.7
MD-05	1931	30.6	3.3	9.1
MD-05	1932	33.5	4.1	8.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1933	26.3	4.0	6.6
MD-05	1934	27.5	3.7	7.5
MD-05	1935	34.2	4.1	8.3
MD-05	1936	15.0	2.9	5.2
MD-05	1937	27.2	3.0	8.9
MD-05	1938	35.7	3.7	9.8
MD-05	1939	38.8	2.7	14.2
MD-05	1940	33.9	4.0	8.5
MD-05	1943	16.1	3.7	4.4
MD-05	1944	14.1	4.3	3.3
MD-05	1945	21.4	4.3	5.0
MD-05	1946	15.9	1.5	10.4
MD-05	1947	10.0	3.2	3.1
MD-05	1950	10.4	1.8	5.7
MD-05	1951	23.2	2.1	10.9
MD-05	1952	38.2	4.1	9.3
MD-05	1953	31.0	3.8	8.1
MD-05	1954	20.6	2.9	7.1
MD-05	1955	22.0	3.0	7.2
MD-05	1956	23.1	3.5	6.6
MD-05	1957	18.8	3.8	4.9
MD-05	1958	16.5	3 8	4.3
MD-05	1959	16.5	4.3	3.9
MD-05	1960	25.7	2.8	9.3
MD-05	1961	20.6	3.5	5.9
MD-05	1962	17.0	4.1	4.1
MD-05	1963	17.9	2.6	6.9
MD-05	1964	22.2	2.6	8.5
MD-05	1965	31.9	2.3	13.9
MD-05	1966	34.4	4.0	8.7
MD-05	1967	18.4	3.4	5.5
MD-05	1968	11.2	4.1	2.7
MD-05	1969	15.9	2.8	5.8
MD-05	1971	17.1	3.5	4.9
MD-05	1973	30.0	3.7	8.2
MD-05	1976	28.1	2.1	13.1
MD-05	1977	30.9	1.7	18.4
MD-05	1978	27.4	2.9	9.4
MD-05	1979	34.8	3.4	10.4
MD-05	1981	24.1	2.9	8.3
MD-05	1982	27.4	2.3	11.9
MD-05	1983	21.7	3.3	6.5
MD-05	1984	21.4	3.8	5.6
MD-05	1985	27.1	3.3	8.1
MD-05	1987	28.3	3.0	9.3
MD-05	1989	32.1	3.1	10.5
MD-05	1990	30.9	2.9	10.6
MD-05	1991	23.0	2.9	7.9

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	1992	19.0	3.4	5.6
MD-05	1993	33.0	3.2	10.3
MD-05	1995	19.3	3.7	5.3
MD-05	1996	31.6	3.2	9.9
MD-05	1997	27.5	2.9	9.5
MD-05	1998	26.3	3.0	8.6
MD-05	2000	28.3	2.8	10.3
MD-05	2001	42.1	3.7	11.5
MD-05	2005	34.2	2.5	14.0
MD-05	2007	12.4	3.2	3.9
MD-05	2013	11.1	1.8	6.0
MD-05	2018	14.7	1.1	13.7
MD-05	2019	13.6	4.0	3.4
MD-05	2020	13.9	2.8	5.1
MD-05	2021	15.8	3.1	5.2
MD-05	2022	17.1	2.5	7.0
MD-05	2023	16.8	4.1	4.1
MD-05	2024	11.5	4.0	2.9
MD-05	2025	22.0	3.5	6.3
MD-05	2026	17.1	4.0	4.3
MD-05	2027	24.0	2.9	8.3
MD-05	2028	15.5	3.8	4.1
MD-05	2029	19.6	3.5	5.6
MD-05	2030	23.1	2.8	8.4
MD-05	2031	16.1	3.2	5.0
MD-05	2032	17.5	4.0	4.4
MD-05	2033	21.9	4.4	4.9
MD-05	2034	23.9	4.0	6.0
MD-05	2035	23.2	4.6	5.1
MD-05	2036	19.0	4.1	4.6
MD-05	2037	23.2	2.9	8.0
MD-05	2038	22.8	3.0	7.5
MD-05	2039	21.9	2.3	9.6
MD-05	2040	16.5	0.9	18.0
MD-05	2042	18.1	2.0	9.1
MD-05	2043	26.4	1.5	17.4
MD-05	2045	15.9	4.0	4.0
MD-05	2046	17.5	3.7	4.8
MD-05	2047	14.7	4.3	3.4
MD-05	2048	18.8	3.5	5.3
MD-05	2049	15.6	3.5	4.5
MD-05	2051	22.6	3.0	7.4
MD-05	2052	25.5	3.2	8.0
MD-05	2053	21.7	3.0	7.1
MD-05	2054	18.1	4.0	4.5
MD-05	2055	26.1	2.0	13.1
MD-05	2056	31.5	2.8	11.4

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	2057	28.1	3.8	7.4
MD-05	2058	34.1	2.9	11.8
MD-05	2059	36.0	4.0	9.1
MD-05	2060	31.2	3.8	8.2
MD-05	2061	34.5	3.4	10.3
MD-05	2062	26.1	3.1	8.5
MD-05	2063	17.8	3.5	5.1
MD-05	2064	30.4	3.5	8.7
MD-05	2065	25.5	2.9	8.8
MD-05	2066	28.1	3.3	8.4
MD-05	2067	39.5	3.2	12.4
MD-05	2068	35.2	3.5	10.1
MD-05	2069	25.4	3.3	7.6
MD-05	2070	41.2	3.2	12.8
MD-05	2071	43.4	3.3	12.9
MD-05	2073	43.7	4.0	11.0
MD-05	2074	32.5	2.9	11.2
MD-05	2075	34.1	3.3	10.2
MD-05	2076	38.8	3.0	12.7
MD-05	2077	30.7	4.0	7.8
MD-05	2078	22.9	3.0	7.5
MD-05	2079	27.5	3.8	7.2
MD-05	2080	27.1	3.2	8.5
MD-05	2083	11.8	1.4	8.6
MD-05	2084	13.5	2.7	4.9
MD-05	2085	17.8	2.7	6.5
MD-05	2087	15.3	4.3	3.6
MD-05	2089	22.9	3.7	6.3
MD-05	2091	34.2	4.0	8.6
MD-05	2092	30.9	3.2	9.6
MD-05	2093	15.0	1.5	9.8
MD-05	2095	20.0	3.4	6.0
MD-05	2096	14.3	3.2	4.5
MD-05	2097	17.1	2.0	8.6
MD-05	2098	20.5	3.7	5.6
MD-05	2099	12.9	1.2	10.6
MD-05	2100	19.0	3.4	5.6
MD-05	2101	24.1	3.2	7.5
MD-05	2104	28.3	4.1	6.9
MD-05	2105	39.4	4.1	9.6
MD-05	2106	35.9	3.8	9.4
MD-05	2107	13.5	3.0	4.4
MD-05	2108	12.0	3.2	3.7
MD-05	2109	20.8	3.4	6.2
MD-05	2110	18.8	3.5	5.3
MD-05	2111	12.3	3.8	3.2
MD-05	2112	21.3	3.5	6.1
MD-05	2113	25.1	3.5	7.1
MD-05	2114	24.6	3.5	7.0
MD-05	2115	20.0	3.5	5.7

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
MD-05	2117	18.7	4.3	4.4
MD-05	2118	24.1	2.1	11.3
MD-05	2119	15.6	1.8	8.5
MD-05	2120	15.0	3.4	4.5
MD-05	2122	15.8	4.7	3.3
MD-05	2124	20.0	3.7	5.5
MD-05	2125	22.9	4.3	5.4
MD-05	2127	20.2	1.5	13.2
MD-05	2128	23.7	3.7	6.5
MD-05	2131	21.6	2.0	10.8
MD-05	2132	20.6	2.8	7.5
MD-05	2133	15.6	3.4	4.6
MD-05	2134	19.7	2.8	7.2
MD-05	2136	18.7	3.8	4.9
MD-05	2137	19.0	4.0	4.8
MD-05	2140	17.5	3.2	5.5
MD-05	2141	21.1	3.0	6.9
MD-05	2143	33.2	2.9	11.4
MD-05	2144	40.6	3.0	13.4
MD-05	2145	38.2	3.5	10.8
MD-05	2146	32.7	3.0	10.7
MD-05	2148	43.2	3.4	12.9
MD-05	2149	39.4	3.3	11.8
MD-05	2154	39.0	3.3	11.7
MD-05	2156	13.8	1.2	11.3
MD-05	2157	23.5	3.7	6.4
MD-05	2158	24.5	3.0	8.0
TOTAL:	502	12749.6	1536.1	5321.2

Ratio of Averages: 8.3

Average Ratio: 10.6

TABLE 10
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Waste	Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
	ID-05	0377	31.8	1.8	17.9
	ID-05	0379	35.9	2.2	16.1
	ID-05	0386	48.3	1.7	28.8
	ID-05	0414	47.3	2.2	21.5
	ID-05	0483	45.0	0.9	48.3
	ID-05	0484	29.9	4.4	6.8
	ID-05	0775	28.7	3.4	8.5
	ID-05	0776	48.8	4.3	11.4
	ID-05	0777	37.9	3.7	10.3
	ID-05	0778	36.6	3.7	10.0
	ID-05	0788	26.8	3.9	6.8
	ID-05	0789	25.1	1.3	18.7
	ID-05	0790	18.7	4.3	4.3
	ID-05	0792	18.5	1.0	18.9
	ID-05	0794	23.9	2.5	9.5
	ID-05	0795	13.8	4.1	3.3
	ID-05	0796	14.4	0.3	46.5
	ID-05	0797	19.2	3.2	6.1
	ID-05	0798	31.5	2.4	13.0
	ID-05	0800	21.1	3.9	5.4
	ID-05	0802	35.4	1.4	25.1
	ID-05	0803	12.6	0.9	14.1
	ID-05	0805	18.7	2.7	7.0
	ID-05	0806	37.6	2.3	16.4
	ID-05	0807	25.0	1.2	20.5
	ID-05	0808	26.9	0.6	42.0
	ID-05	0809	24.1	3.7	6.5
	ID-05	0812	21.7	0.9	23.9
	ID-05	0816	26.0	4.0	6.5
	ID-05	0817	35.9	2.3	15.7
	ID-05	0818	18.1	0.6	29.6
	ID-05	0820	34.5	2.1	16.2
	ID-05	0852	26.9	0.6	44.1
	ID-05	0868	21.1	2.8	7.6
	ID-05	0869	17.5	3.3	5.4
	ID-05	0870	18.7	3.5	5.3
	ID-05	0871	33.6	3.4	9.9
	ID-05	0872	31.1	3.4	9.2
	ID-05	0873	25.1	1.5	16.4
	ID-05	0875	34.2	4.4	7.8
	ID-05	0876	40.9	3.2	12.9
	ID-05	0878	37.4	3.2	11.8

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	0880	19.6	4.2	4.7
ID-05	0881	23.5	3.6	6.6
ID-05	0882	24.5	0.3	78.9
ID-05	0883	25.4	4.2	6.1
ID-05	0886	34.8	3.8	9.1
ID-05	0887	16.2	4.2	3.9
ID-05	0888	38.5	2.9	13.1
ID-05	0889	24.1	0.6	39.0
ID-05	0890	46.1	4.0	11.6
ID-05	0891	23.9	4.5	5.3
ID-05	0893	47.0	3.7	12.8
ID-05	0894	38.8	3.7	10.4
ID-05	0895	40.9	4.0	10.2
ID-05	0897	17.9	3.6	5.0
ID-05	0898	21.6	3.2	6.8
ID-05	0899	43.4	2.7	16.2
ID-05	1023	23.2	1.7	13.9
ID-05	1024	29.0	3.0	9.5
ID-05	1025	34.8	4.0	8.7
ID-05	1026	33.9	2.3	15.1
ID-05	1027	29.6	2.8	10.6
ID-05	1028	44.9	2.4	18.6
ID-05	1031	30.9	4.0	7.7
ID-05	1033	31.8	3.4	9.3
ID-05	1034	27.6	3.7	7.5
ID-05	1035	22.9	3.7	6.2
ID-05	1037	36.0	4.1	8.9
ID-05	1038	31.8	4.3	7.4
ID-05	1039	38.8	3.9	9.8
ID-05	1040	18.4	4.1	4.5
ID-05	1041	25.7	4.2	6.1
ID-05	1042	39.8	1.3	31.1
ID-05	1043	37.9	2.8	13.5
ID-05	1044	26.0	1.7	15.2
ID-05	1045	31.5	1.5	20.3
ID-05	1046	28.4	2.1	13.3
ID-05	1047	37.9	2.8	13.5
ID-05	1048	27.7	3.3	8.5
ID-05	1049	41.2	2.8	15.0
ID-05	1050	24.9	3.3	7.4
ID-05	1051	41.6	3.5	12.1
ID-05	1052	31.2	1.7	18.8
ID-05	1053	19.3	3.9	4.9
ID-05	1054	32.3	3.3	9.6
ID-05	1055	32.1	3.1	10.3
ID-05	1056	34.5	3.4	10.3
ID-05	1057	43.0	3.0	14.5
ID-05	1059	28.1	2.1	13.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1060	48.5	1.7	28.4
ID-05	1061	34.5	0.7	51.4
ID-05	1062	32.4	3.1	10.4
ID-05	1159	43.9	2.4	18.4
ID-05	1160	36.7	4.2	8.7
ID-05	1161	34.3	3.9	8.9
ID-05	1162	37.3	0.8	46.0
ID-05	1163	28.9	3.7	7.8
ID-05	1164	43.0	4.1	10.6
ID-05	1166	23.9	4.6	5.2
ID-05	1167	22.6	4.8	4.7
ID-05	1168	25.4	4.1	6.2
ID-05	1169	22.6	4.6	4.9
ID-05	1170	42.8	2.4	18.0
ID-05	1171	47.9	3.5	13.9
ID-05	1172	34.2	2.0	16.9
ID-05	1173	29.6	0.4	68.9
ID-05	1174	34.5	2.6	13.2
ID-05	1175	41.2	1.6	25.3
ID-05	1177	25.4	3.2	7.8
ID-05	1178	25.4	4.0	6.4
ID-05	1180	30.9	3.8	8.2
ID-05	1181	43.2	3.6	12.1
ID-05	1182	14.7	3.1	4.8
ID-05	1183	24.5	3.7	6.6
ID-05	1184	26.6	3.7	7.1
ID-05	1185	35.7	2.8	12.7
ID-05	1187	38.5	3.9	9.8
ID-05	1188	22.3	3.2	6.9
ID-05	1189	15.9	2.3	7.0
ID-05	1190	30.4	2.4	12.5
ID-05	1191	41.8	3.1	13.4
ID-05	1192	18.1	1.6	10.9
ID-05	1193	30.1	2.3	13.0
ID-05	1194	34.2	3.5	9.9
ID-05	1195	18.1	0.4	40.1
ID-05	1196	29.6	2.9	10.3
ID-05	1197	34.8	4.3	8.2
ID-05	1198	19.3	2.7	7.2
ID-05	1199	25.2	2.3	10.8
ID-05	1200	22.9	3.0	7.7
ID-05	1201	23.0	3.0	7.5
ID-05	1202	21.7	4.0	5.4
ID-05	1204	22.3	3.7	6.1
ID-05	1206	19.3	3.9	5.0
ID-05	1207	17.9	3.0	6.0
ID-05	1209	23.0	3.2	7.3
ID-05	1210	32.2	3.2	10.2

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1213	28.4	1.6	17.2
ID-05	1214	29.0	0.8	35.0
ID-05	1215	32.7	1.1	28.4
ID-05	1217	39.7	1.7	23.2
ID-05	1218	22.9	3.8	6.0
ID-05	1219	28.4	4.5	6.3
ID-05	1220	9.5	3.2	3.0
ID-05	1221	24.1	3.3	7.3
ID-05	1222	44.6	4.0	11.3
ID-05	1224	28.4	3.9	7.3
ID-05	1227	42.8	2.0	21.3
ID-05	1228	40.9	3.1	13.0
ID-05	1231	29.6	3.8	7.8
ID-05	1232	28.1	3.9	7.3
ID-05	1233	31.5	4.4	7.1
ID-05	1234	42.5	3.3	12.7
ID-05	1235	30.9	3.8	8.2
ID-05	1236	32.9	4.2	7.9
ID-05	1237	44.4	2.8	16.0
ID-05	1238	23.5	5.0	4.7
ID-05	1239	38.2	2.2	17.4
ID-05	1240	50.4	0.3	162.5
ID-05	1241	25.1	0.3	80.9
ID-05	1242	21.4	2.2	9.7
ID-05	1243	27.8	0.3	89.7
ID-05	1244	41.2	4.3	9.5
ID-05	1245	35.1	1.8	19.3
ID-05	1248	33.3	2.2	14.9
ID-05	1306	44.9	2.8	16.3
ID-05	1307	42.4	3.1	13.9
ID-05	1310	38.1	2.2	17.3
ID-05	1313	36.3	3.8	9.5
ID-05	1314	19.6	1.2	16.1
ID-05	1316	26.3	1.2	21.5
ID-05	1317	30.9	0.6	50.6
ID-05	1557	29.7	4.0	7.4
ID-05	1558	40.6	2.4	16.7
ID-05	1590	32.1	3.4	9.5
ID-05	1692	27.8	1.7	16.0
ID-05	1703	30.0	1.6	18.8
ID-05	1706	35.4	2.0	17.9
ID-05	1707	44.3	1.5	30.1
ID-05	1708	37.9	2.5	14.9
ID-05	1731	35.9	3.0	12.1
ID-05	1732	26.0	2.7	9.7
ID-05	1733	26.8	2.9	9.4
ID-05	1734	18.6	2.8	6.8
ID-05	1735	29.1	3.2	9.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1736	11.7	3.0	3.9
ID-05	1737	12.9	3.8	3.4
ID-05	1738	28.6	3.3	8.8
ID-05	1739	14.8	2.4	6.2
ID-05	1740	23.6	3.3	7.0
ID-05	1741	24.3	3.4	7.1
ID-05	1742	22.5	3.4	6.7
ID-05	1743	21.4	2.1	10.0
ID-05	1744	28.1	1.9	14.6
ID-05	1745	39.7	3.0	13.3
ID-05	1746	38.1	3.7	10.2
ID-05	1747	19.4	3.2	6.0
ID-05	1748	22.6	3.2	7.0
ID-05	1749	11.4	3.0	3.7
ID-05	1750	35.0	4.0	8.9
ID-05	1751	12.6	3.2	4.0
ID-05	1752	25.4	3.6	7.0
ID-05	1753	18.7	3.3	5.7
ID-05	1754	33.6	3.8	8.8
ID-05	1755	25.4	3.5	7.4
ID-05	1756	18.2	3.4	5.4
ID-05	1757	35.2	3.3	10.6
ID-05	1758	18.7	3.9	4.8
ID-05	1759	17.5	3.7	4.8
ID-05	1760	20.9	3.0	7.0
ID-05	1761	15.0	3.2	4.7
ID-05	1762	21.8	2.3	9.7
ID-05	1763	17.6	2.7	6.5
ID-05	1764	19.2	3.1	6.2
ID-05	1765	19.7	2.9	6.7
ID-05	1766	22.4	3.3	6.7
ID-05	1767	32.7	3.4	9.6
ID-05	1768	41.9	3.3	12.8
ID-05	1769	34.7	3.3	10.6
ID-05	1770	30.1	3.4	8.9
ID-05	1771	28.0	3.6	7.8
ID-05	1772	27.4	3.4	8.1
ID-05	1773	43.8	3.8	11.7
ID-05	1774	14.7	3.1	4.7
ID-05	1775	16.5	0.7	23.3
ID-05	1776	44.0	3.8	11.7
ID-05	1777	21.6	2.8	7.7
ID-05	1778	27.7	3.7	7.4
ID-05	1779	10.7	3.2	3.4
ID-05	1780	22.0	3.5	6.4
ID-05	1781	13.5	3.3	4.1
ID-05	1782	13.5	3.4	4.0
ID-05	1783	13.2	3.4	3.9

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1784	27.5	3.5	7.8
ID-05	1785	25.1	3.5	7.2
ID-05	1786	24.8	3.4	7.4
ID-05	1787	21.4	3.5	6.2
ID-05	1788	16.2	3.7	4.4
ID-05	1789	12.6	3.8	3.3
ID-05	1790	19.9	2.8	7.0
ID-05	1791	22.9	3.5	6.6
ID-05	1792	17.5	4.0	4.3
ID-05	1793	13.8	5.3	2.6
ID-05	1794	18.1	0.3	53.1
ID-05	1795	19.0	3.8	4.9
ID-05	1796	24.3	3.1	7.7
ID-05	1797	22.0	4.3	5.2
ID-05	1798	16.5	3.2	5.1
ID-05	1799	19.0	3.1	6.2
ID-05	1800	23.8	3.3	7.1
ID-05	1801	18.4	3.0	6.1
ID-05	1839	21.1	3.7	5.8
ID-05	1840	16.2	2.9	5.6
ID-05	1841	22.0	4.3	5.2
ID-05	1842	28.1	4.0	7.1
ID-05	1843	31.5	2.8	11.4
ID-05	1844	15.0	3.4	4.5
ID-05	1845	15.5	2.4	6.3
ID-05	1846	17.5	4.0	4.4
ID-05	1847	28.4	3.4	8.5
ID-05	1848	20.8	3.7	5.7
ID-05	1849	10.4	2.6	4.0
ID-05	1850	12.6	3.0	4.1
ID-05	1851	12.7	3.1	4.2
ID-05	1852	12.3	3.3	3.7
ID-05	1853	31.5	3.0	10.3
ID-05	1854	16.5	4.0	4.2
ID-05	1855	20.8	3.1	6.8
ID-05	1856	22.6	4.3	5.3
ID-05	1857	23.1	2.3	10.1
ID-05	1858	24.1	4.3	5.6
ID-05	1859	15.6	4.3	3.7
ID-05	1860	13.2	3.4	3.9
ID-05	1861	15.5	2.9	5.3
ID-05	1862	10.1	2.3	4.4
ID-05	1863	13.2	1.2	10.7
ID-05	1864	8.9	3.1	2.9
ID-05	1866	26.8	2.4	11.0
ID-05	1867	23.9	2.4	9.8
ID-05	1868	28.1	3.7	7.7
ID-05	1869	24.1	3.7	6.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1870	32.4	3.1	10.6
ID-05	1871	19.9	3.4	5.9
ID-05	1874	14.7	3.5	4.2
ID-05	1875	11.1	3.7	3.0
ID-05	1883	14.7	3.3	4.4
ID-05	1884	15.6	2.1	7.3
ID-05	1885	15.3	1.2	12.6
ID-05	1886	13.2	0.9	14.3
ID-05	1887	11.4	1.5	7.4
ID-05	1888	13.5	0.6	22.1
ID-05	1889	12.6	2.5	5.1
ID-05	1891	22.3	3.3	6.7
ID-05	1892	26.9	3.7	7.3
ID-05	1893	28.4	3.4	8.5
ID-05	1898	10.4	3.0	3.4
ID-05	1899	25.5	3.5	7.3
ID-05	1900	23.9	3.7	6.5
ID-05	1901	23.7	3.8	6.2
ID-05	1902	17.5	3.7	4.8
ID-05	1903	17.8	3.8	4.6
ID-05	1904	11.4	2.1	5.3
ID-05	1905	12.6	2.8	4.6
ID-05	1906	13.8	2.1	6.4
ID-05	1907	14.7	2.4	6.0
ID-05	1909	16.8	2.1	7.9
ID-05	1910	33.1	4.4	7.5
ID-05	1911	14.1	4.4	3.2
ID-05	1912	26.6	3.4	7.9
ID-05	1913	26.6	3.7	7.2
ID-05	1914	26.0	3.1	8.5
ID-05	1915	19.0	4.0	4.8
ID-05	1916	22.0	4.0	5.5
ID-05	1917	14.4	3.4	4.3
ID-05	1918	18.1	4.3	4.2
ID-05	1919	22.6	4.0	5.7
ID-05	1920	26.3	2.7	9.6
ID-05	1921	16.5	2.9	5.7
ID-05	1922	17.1	2.9	5.9
ID-05	1923	18.4	3.1	6.0
ID-05	1924	26.3	2.4	10.8
ID-05	1925	23.7	2.9	8.2
ID-05	1926	24.5	3.5	7.0
ID-05	1927	24.5	4.0	6.2
ID-05	1928	27.4	2.9	9.4
ID-05	1929	25.1	3.4	7.5
ID-05	1930	28.1	3.7	7.7
ID-05	1931	30.6	3.3	9.1
ID-05	1932	33.5	4.1	8.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1933	26.3	4.0	6.6
ID-05	1934	27.5	3.7	7.5
ID-05	1935	34.2	4.1	8.3
ID-05	1936	15.0	2.9	5.2
ID-05	1937	27.2	3.0	8.9
ID-05	1938	35.7	3.7	9.8
ID-05	1939	38.8	2.7	14.2
ID-05	1940	33.9	4.0	8.5
ID-05	1943	16.1	3.7	4.4
ID-05	1944	14.1	4.3	3.3
ID-05	1945	21.4	4.3	5.0
ID-05	1946	15.9	1.5	10.4
ID-05	1947	10.0	3.2	3.1
ID-05	1950	10.4	1.8	5.7
ID-05	1951	23.2	2.1	10.9
ID-05	1952	38.2	4.1	9.3
ID-05	1953	31.0	3.8	8.1
ID-05	1954	20.6	2.9	7.1
ID-05	1955	22.0	3.0	7.2
ID-05	1956	23.1	3.5	6.6
ID-05	1957	18.8	3.8	4.9
ID-05	1958	16.5	3.8	4.3
ID-05	1959	16.5	4.3	3.9
ID-05	1960	25.7	2.8	9.3
ID-05	1961	20.6	3.5	5.9
ID-05	1962	17.0	4.1	4.1
ID-05	1963	17.9	2.6	6.9
ID-05	1964	22.2	2.6	8.5
ID-05	1965	31.9	2.3	13.9
ID-05	1966	34.4	4.0	8.7
ID-05	1967	18.4	3.4	5.5
ID-05	1968	11.2	4.1	2.7
ID-05	1969	15.9	2.8	5.8
ID-05	1971	17.1	3.5	4.9
ID-05	1973	30.0	3.7	8.2
ID-05	1976	28.1	2.1	13.1
ID-05	1977	30.9	1.7	18.4
ID-05	1978	27.4	2.9	9.4
ID-05	1979	34.8	3.4	10.4
ID-05	1981	24.1	2.9	8.3
ID-05	1982	27.4	2.3	11.9
ID-05	1983	21.7	3.3	6.5
ID-05	1984	21.4	3.8	5.6
ID-05	1985	27.1	3.3	8.1
ID-05	1987	28.3	3.0	9.3
ID-05	1989	32.1	3.1	10.5
ID-05	1990	30.9	2.9	10.6
ID-05	1991	23.0	2.9	7.9

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	1992	19.0	3.4	5.6
ID-05	1993	33.0	3.2	10.3
ID-05	1995	19.3	3.7	5.3
ID-05	1996	31.6	3.2	9.9
ID-05	1997	27.5	2.9	9.5
ID-05	1998	26.3	3.0	8.6
ID-05	2000	28.3	2.8	10.3
ID-05	2001	42.1	3.7	11.5
ID-05	2005	34.2	2.5	14.0
ID-05	2007	12.4	3.2	3.9
ID-05	2013	11.1	1.8	6.0
ID-05	2018	14.7	1.1	13.7
ID-05	2019	13.6	4.0	3.4
ID-05	2020	13.9	2.8	5.1
ID-05	2021	15.8	3.1	5.2
ID-05	2022	17.1	2.5	7.0
ID-05	2023	16.8	4.1	4.1
ID-05	2024	11.5	4.0	2.9
ID-05	2025	22.0	3.5	6.3
ID-05	2026	17.1	4.0	4.3
ID-05	2027	24.0	2.9	8.3
ID-05	2028	15.5	3.8	4.1
ID-05	2029	19.6	3.5	5.6
ID-05	2030	23.1	2.8	8.4
ID-05	2031	16.1	3.2	5.0
ID-05	2032	17.5	4.0	4.4
ID-05	2033	21.9	4.4	4.9
ID-05	2034	23.9	4.0	6.0
ID-05	2035	23.2	4.6	5.1
ID-05	2036	19.0	4.1	4.6
ID-05	2037	23.2	2.9	8.0
ID-05	2038	22.8	3.0	7.5
ID-05	2039	21.9	2.3	9.6
ID-05	2040	16.5	0.9	18.0
ID-05	2042	18.1	2.0	9.1
ID-05	2043	26.4	1.5	17.4
ID-05	2045	15.9	4.0	4.0
ID-05	2046	17.5	3.7	4.8
ID-05	2047	14.7	4.3	3.4
ID-05	2048	18.8	3.5	5.3
ID-05	2049	15.6	3.5	4.5
ID-05	2051	22.6	3.0	7.4
ID-05	2052	25.5	3.2	8.0
ID-05	2053	21.7	3.0	7.1
ID-05	2054	18.1	4.0	4.5
ID-05	2055	26.1	2.0	13.1
ID-05	2056	31.5	2.8	11.4
ID-05	2057	28.1	3.8	7.4

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	2058	34.1	2.9	11.8
ID-05	2059	36.0	4.0	9.1
ID-05	2060	31.2	3.8	8.2
ID-05	2061	34.5	3.4	10.3
ID-05	2062	26.1	3.1	8.5
ID-05	2063	17.8	3.5	5.1
ID-05	2064	30.4	3.5	8.7
ID-05	2065	25.5	2.9	8.8
ID-05	2066	28.1	3.3	8.4
ID-05	2067	39.5	3.2	12.4
ID-05	2068	35.2	3.5	10.1
ID-05	2069	25.4	3.3	7.6
ID-05	2070	41.2	3.2	12.8
ID-05	2071	43.4	3.3	12.9
ID-05	2073	43.7	4.0	11.0
ID-05	2074	32.5	2.9	11.2
ID-05	2075	34.1	3.3	10.2
ID-05	2076	38.8	3.0	12.7
ID-05	2077	30.7	4.0	7.8
ID-05	2078	22.9	3.0	7.5
ID-05	2079	27.5	3.8	7.2
ID-05	2080	27.1	3.2	8.5
ID-05	2083	11.8	1.4	8.6
ID-05	2084	13.5	2.7	4.9
ID-05	2085	17.8	2.7	6.5
ID-05	2087	15.3	4.3	3.6
ID-05	2089	22.9	3.7	6.3
ID-05	2091	34.2	4.0	8.6
ID-05	2092	30.9	3.2	9.6
ID-05	2093	15.0	1.5	9.8
ID-05	2095	20.0	3.4	6.0
ID-05	2096	14.3	3.2	4.5
ID-05	2097	17.1	2.0	8.6
ID-05	2098	20.5	3.7	5.6
ID-05	2099	12.9	1.2	10.8
ID-05	2100	19.0	3.4	5.6
ID-05	2101	24.1	3.2	7.5
ID-05	2104	28.3	4.1	6.9
ID-05	2105	39.4	4.1	9.6
ID-05	2106	35.9	3.8	9.4
ID-05	2107	13.5	3.0	4.4
ID-05	2108	12.0	3.2	3.7
ID-05	2109	20.8	3.4	6.2
ID-05	2110	18.8	3.5	5.3
ID-05	2111	12.3	3.8	3.2
ID-05	2112	21.3	3.5	6.1
ID-05	2113	25.1	3.5	7.1
ID-05	2114	24.6	3.5	7.0

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-05	2115	20.0	3.5	5.7
ID-05	2117	18.7	4.3	4.4
ID-05	2118	24.1	2.1	11.3
ID-05	2119	15.6	1.8	8.5
ID-05	2120	15.0	3.4	4.5
ID-05	2122	15.8	4.7	3.3
ID-05	2124	20.0	3.7	5.5
ID-05	2125	22.9	4.3	5.4
ID-05	2127	20.2	1.5	13.2
ID-05	2128	23.7	3.7	6.5
ID-05	2131	21.6	2.0	10.8
ID-05	2132	20.6	2.8	7.5
ID-05	2133	15.6	3.4	4.6
ID-05	2134	19.7	2.8	7.2
ID-05	2136	18.7	3.8	4.9
ID-05	2137	19.0	4.0	4.8
ID-05	2140	17.5	3.2	5.5
ID-05	2141	21.1	3.0	6.9
ID-05	2143	33.2	2.9	11.4
ID-05	2144	40.6	3.0	13.4
ID-05	2145	38.2	3.5	10.8
ID-05	2146	32.7	3.0	10.7
ID-05	2148	43.2	3.4	12.9
ID-05	2149	39.4	3.3	11.8
ID-05	2154	39.0	3.3	11.7
ID-05	2156	13.8	1.2	11.3
ID-05	2157	23.5	3.7	6.4
ID-05	2158	24.5	3.0	8.0
TOTAL:	502	12749.6	1536.1	5321.2

Ratio of Averages: 8.3

Average Ratio: 10.6

TABLE 10 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-06	1082	25.1	1.2	20.5
ID-06	1083	25.1	0.6	41.1
ID-06	1084	27.2	1.6	16.8
TOTAL:	3	77.3	3.5	78.4

Ratio of Averages: 22.4

Average Ratio: 26.1

TABLE 10 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-07	0900	24.8	2.4	10.2
ID-07	0902	33.6	2.3	14.9
ID-07	0903	17.5	1.3	13.3
ID-07	0904	27.2	2.3	11.9
ID-07	0905	26.3	2.0	13.1
ID-07	0908	24.8	0.6	39.9
ID-07	0909	14.4	1.5	9.4
ID-07	0910	17.1	1.5	11.1
ID-07	1015	22.9	1.8	12.7
ID-07	1016	37.0	1.4	26.4
ID-07	1017	31.8	2.5	13.0
ID-07	1075	46.7	1.3	36.5
ID-07	1076	22.0	2.1	10.6
ID-07	1077	25.4	2.2	11.4
ID-07	1078	37.6	0.6	62.7
ID-07	1079	38.2	0.7	57.8
ID-07	1085	23.5	1.6	14.8
ID-07	1093	31.5	1.2	25.8
TOTAL:	18	502.1	29.3	395.5

Ratio of Averages: 17.1

Average Ratio: 22.0

TABLE 10 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Hart Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ID-08	1072	37.3	1.5	24.9
ID-08	1087	36.7	2.4	15.0
TOTAL:	2	74.0	3.9	39.9

Ratio of Averages: 18.8

Average Ratio: 20.0

TABLE 11
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fife Lake Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-01	0474	30.3	0.3	121.0
IE-01	0477	34.8	0.4	94.0
IE-01	0492	27.7	0.3	110.9
IE-01	0536	29.5	0.6	48.3
TOTAL:	4	122.2	1.5	374.2

Ratio of Averages: 82.6

Average Ratio: 93.6

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-03	0454	38.2	0.3	127.3
IE-03	0468	46.5	0.5	89.5
IE-03	0470	43.8	0.7	61.7
IE-03	0471	37.3	0.2	232.8
TOTAL:	4	165.7	1.7	511.2

Ratio of Averages: 127.8

Average Ratio: 98.1

TABLE 11 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fife Lake Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-04	1083	40.9	0.3	132.0
TOTAL:	1	40.9	0.3	132.0

Ratio of Averages: 132.0

Average Ratio: 132.0

TABLE 11 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fife Lake Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-05	0900	37.0	0.6	67.2
IE-05	0903	26.6	0.8	33.2
IE-05	0904	33.9	0.9	36.9
IE-05	0905	33.9	0.6	55.6
IE-05	0910	31.5	0.3	101.5
IE-05	1016	45.8	0.3	152.7
IE-05	1017	43.0	0.5	82.8
IE-05	1072	47.9	0.7	64.8
IE-05	1076	31.5	0.6	51.6
IE-05	1077	36.0	1.2	31.1
IE-05	1079	47.6	1.2	39.7
IE-05	1083	40.9	0.3	132.0
IE-05	1085	32.7	0.6	53.6
IE-05	1093	41.8	1.2	34.0
IE-05	1096	30.6	0.6	50.1
IE-05	1102	50.1	0.3	161.5
TOTAL:	16	610.8	10.8	1148.2

Ratio of Averages: 56.6

Average Ratio: 71.8

TABLE 11 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fife Lake Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ME-06	0483	50.0	0.5	106.3
ME-06	0484	39.7	0.9	41.8
ME-06	0775	36.0	1.2	31.1
ME-06	0777	49.6	1.1	46.4
ME-06	0778	45.5	0.6	74.6
ME-06	0788	38.8	1.2	31.5
ME-06	0790	29.0	0.9	31.6
ME-06	0795	25.7	0.3	82.8
ME-06	0796	27.5	0.3	88.7
ME-06	0797	27.2	0.8	34.0
ME-06	0800	29.0	0.6	46.8
ME-06	0803	18.1	0.3	58.3
ME-06	0805	27.8	0.3	89.7
ME-06	0808	35.1	0.3	113.3
ME-06	0812	27.8	0.6	44.9
ME-06	0816	36.6	0.9	39.4
ME-06	0817	43.0	0.5	93.6
ME-06	0852	32.1	0.3	103.5
ME-06	0868	36.3	0.7	49.8
ME-06	0870	27.2	0.5	59.1
ME-06	0871	42.8	0.7	63.8
ME-06	0872	43.0	0.6	69.4
ME-06	0880	30.3	0.8	37.8
ME-06	0881	30.6	0.7	41.9
ME-06	0882	33.3	0.3	107.4
ME-06	0883	35.1	0.9	38.2
ME-06	0886	44.9	0.9	52.2
ME-06	0888	46.1	0.8	59.9
ME-06	0891	34.2	0.9	39.8
ME-06	0895	50.1	0.9	54.4
ME-06	0897	26.0	0.3	83.8
ME-06	0899	50.4	0.4	117.1
ME-06	1024	41.5	0.3	134.0
ME-06	1025	44.9	0.3	144.8
ME-06	1027	42.1	0.6	69.1
ME-06	1033	40.9	0.4	95.2
ME-06	1035	33.3	0.9	36.2
ME-06	1037	44.9	0.9	48.8
ME-06	1038	43.0	0.8	53.8
ME-06	1039	47.4	1.4	35.1
ME-06	1040	28.4	0.8	34.2

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ME-06	1045	39.7	0.3	128.1
ME-06	1052	39.7	0.3	128.1
ME-06	1053	31.2	0.3	100.5
ME-06	1061	40.9	0.6	70.6
ME-06	1163	36.0	1.3	27.9
ME-06	1167	34.7	1.0	34.4
ME-06	1168	37.0	1.2	30.3
ME-06	1169	35.1	0.6	57.6
ME-06	1170	49.8	0.7	74.3
ME-06	1172	43.4	0.3	139.9
ME-06	1175	50.4	0.4	136.1
ME-06	1177	35.7	0.3	115.3
ME-06	1178	36.0	0.6	58.1
ME-06	1182	22.9	0.3	76.5
ME-06	1183	37.0	0.3	119.2
ME-06	1187	46.7	0.3	150.7
ME-06	1188	34.8	0.3	112.3
ME-06	1195	23.2	0.3	75.0
ME-06	1197	44.9	0.6	72.4
ME-06	1204	32.1	0.4	74.6
ME-06	1206	32.1	0.3	103.5
ME-06	1210	42.1	0.3	135.9
ME-06	1213	37.9	0.3	122.2
ME-06	1215	41.8	0.3	134.9
ME-06	1218	31.5	0.5	64.2
ME-06	1219	38.2	0.4	88.8
ME-06	1221	32.1	0.8	40.1
ME-06	1224	37.9	1.0	36.4
ME-06	1227	50.1	0.7	73.6
ME-06	1228	49.2	0.6	89.4
ME-06	1231	40.6	0.6	65.5
ME-06	1232	40.0	0.9	42.1
ME-06	1233	42.4	0.9	49.3
ME-06	1235	41.2	0.8	50.9
ME-06	1236	39.4	1.2	32.0
ME-06	1238	30.9	1.0	30.6
ME-06	1242	30.6	0.7	41.9
ME-06	1244	50.1	0.2	227.5
ME-06	1245	44.6	0.3	143.8
ME-06	1310	46.7	1.2	39.2
ME-06	1316	36.3	0.9	39.5
ME-06	1317	36.3	0.3	117.3
ME-06	1557	43.0	1.6	26.1
ME-06	1558	50.1	0.6	80.7
ME-06	1590	39.4	0.2	246.2
ME-06	1738	37.3	0.2	232.8
ME-06	1739	22.6	0.3	80.8

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
ME-06	1740	33.0	0.3	97.0
ME-06	1741	35.1	0.3	113.3
ME-06	1742	32.1	0.3	103.5
ME-06	1747	29.6	0.3	95.6
ME-06	1749	21.1	0.3	84.4
ME-06	1750	46.1	0.2	288.1
ME-06	1775	23.9	0.6	43.4
ME-06	1792	27.5	0.3	80.9
ME-06	1794	26.3	0.3	93.9
ME-06	1800	33.0	0.3	106.4
ME-06	1801	29.3	0.3	94.6
ME-06	1874	24.6	0.6	39.7
ME-06	1907	25.5	0.6	41.9
ME-06	1971	26.1	0.9	28.7
ME-06	1990	40.5	0.4	89.9
ME-06	1992	28.3	0.3	91.2
ME-06	2006	15.0	0.2	93.8
ME-06	2009	12.7	0.5	27.7
ME-06	2011	11.4	0.3	36.6
ME-06	2034	34.5	0.3	111.4
ME-06	2040	21.4	0.3	69.1
ME-06	2064	40.3	0.3	130.0
ME-06	2069	34.7	0.6	57.8
ME-06	2087	25.1	0.8	32.6
ME-06	2089	30.6	0.6	50.1
ME-06	2091	44.6	0.6	73.1
ME-06	2092	40.6	0.6	65.5
ME-06	2100	29.2	0.2	182.4
ME-06	2110	28.4	0.3	91.7
ME-06	2114	35.1	0.3	113.3
ME-06	2115	29.6	0.3	95.6
ME-06	2117	29.0	0.5	63.1
ME-06	2118	31.3	0.6	51.3
ME-06	2121	21.9	0.3	70.5
ME-06	2122	25.1	0.8	32.6
ME-06	2125	32.2	0.3	104.0
ME-06	2127	27.2	0.5	57.9
ME-06	2131	29.5	0.3	95.1
ME-06	2132	28.4	0.6	45.8
ME-06	2134	26.7	0.6	43.1
ME-06	2137	27.5	0.6	45.1
ME-06	2140	27.4	0.5	58.2
TOTAL:	130	4552.2	73.4	10296.0

Ratio of Averages: 62.0

Average Ratio: 79.2

TABLE 11 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Fife Lake Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-06	0483	50.0	0.5	106.3
IE-06	0484	39.7	0.9	41.8
IE-06	0775	36.0	1.2	31.1
IE-06	0777	49.6	1.1	46.4
IE-06	0778	45.5	0.6	74.6
IE-06	0788	38.8	1.2	31.5
IE-06	0790	29.0	0.9	31.6
IE-06	0795	25.7	0.3	82.8
IE-06	0796	27.5	0.3	88.7
IE-06	0797	27.2	0.8	34.0
IE-06	0800	29.0	0.6	46.8
IE-06	0803	18.1	0.3	58.3
IE-06	0805	27.8	0.3	89.7
IE-06	0808	35.1	0.3	113.3
IE-06	0812	27.8	0.6	44.9
IE-06	0816	36.6	0.9	39.4
IE-06	0817	43.0	0.5	93.6
IE-06	0852	32.1	0.3	103.5
IE-06	0868	36.3	0.7	49.8
IE-06	0870	27.2	0.5	59.1
IE-06	0871	42.8	0.7	63.8
IE-06	0872	43.0	0.6	69.4
IE-06	0880	30.3	0.8	37.8
IE-06	0881	30.6	0.7	41.9
IE-06	0882	33.3	0.3	107.4
IE-06	0883	35.1	0.9	38.2
IE-06	0886	44.9	0.9	52.2
IE-06	0888	46.1	0.8	59.9
IE-06	0891	34.2	0.9	39.8
IE-06	0895	50.1	0.9	54.4
IE-06	0897	26.0	0.3	83.8
IE-06	0899	50.4	0.4	117.1
IE-06	1024	41.5	0.3	134.0
IE-06	1025	44.9	0.3	144.8
IE-06	1027	42.1	0.6	69.1
IE-06	1033	40.9	0.4	95.2
IE-06	1035	33.3	0.9	36.2
IE-06	1037	44.9	0.9	48.8
IE-06	1038	43.0	0.8	53.8
IE-06	1039	47.4	1.4	35.1

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-06	1040	28.4	0.8	34.2
IE-06	1045	39.7	0.3	128.1
IE-06	1052	39.7	0.3	128.1
IE-06	1053	31.2	0.3	100.5
IE-06	1061	40.9	0.6	70.6
IE-06	1163	36.0	1.3	27.9
IE-06	1167	34.7	1.0	34.4
IE-06	1168	37.0	1.2	30.3
IE-06	1169	35.1	0.6	57.6
IE-06	1170	49.8	0.7	74.3
IE-06	1172	43.4	0.3	139.9
IE-06	1175	50.4	0.4	136.1
IE-06	1177	35.7	0.3	115.3
IE-06	1178	36.0	0.6	58.1
IE-06	1182	22.9	0.3	76.5
IE-06	1183	37.0	0.3	119.2
IE-06	1187	46.7	0.3	150.7
IE-06	1188	34.8	0.3	112.3
IE-06	1195	23.2	0.3	75.0
IE-06	1197	44.9	0.6	72.4
IE-06	1204	32.1	0.4	74.6
IE-06	1206	32.1	0.3	103.5
IE-06	1210	42.1	0.3	135.9
IE-06	1213	37.9	0.3	122.2
IE-06	1215	41.8	0.3	134.9
IE-06	1218	31.5	0.5	64.2
IE-06	1219	38.2	0.4	88.8
IE-06	1221	32.1	0.8	40.1
IE-06	1224	37.9	1.0	36.4
IE-06	1227	50.1	0.7	73.6
IE-06	1228	49.2	0.6	89.4
IE-06	1231	40.6	0.6	65.5
IE-06	1232	40.0	0.9	42.1
IE-06	1233	42.4	0.9	49.3
IE-06	1235	41.2	0.8	50.9
IE-06	1236	39.4	1.2	32.0
IE-06	1238	30.9	1.0	30.6
IE-06	1242	30.6	0.7	41.9
IE-06	1244	50.1	0.2	227.5
IE-06	1245	44.6	0.3	143.8
IE-06	1310	46.7	1.2	39.2
IE-06	1316	36.3	0.9	39.5
IE-06	1317	36.3	0.3	117.3
IE-06	1557	43.0	1.6	26.1
IE-06	1558	50.1	0.6	80.7
IE-06	1590	39.4	0.2	246.2
IE-06	1738	37.3	0.2	232.8
IE-06	1739	22.6	0.3	80.8
IE-06	1740	33.0	0.3	97.0
IE-06	1741	35.1	0.3	113.3

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IE-06	1742	32.1	0.3	103.5
IE-06	1747	29.6	0.3	95.6
IE-06	1749	21.1	0.3	84.4
IE-06	1750	46.1	0.2	288.1
IE-06	1775	23.9	0.6	43.4
IE-06	1792	27.5	0.3	80.9
IE-06	1794	26.3	0.3	93.9
IE-06	1800	33.0	0.3	106.4
IE-06	1801	29.3	0.3	94.6
IE-06	1874	24.6	0.6	39.7
IE-06	1907	25.5	0.6	41.9
IE-06	1971	26.1	0.9	28.7
IE-06	1990	40.5	0.4	89.9
IE-06	1992	28.3	0.3	91.2
IE-06	2006	15.0	0.2	93.8
IE-06	2009	12.7	0.5	27.7
IE-06	2011	11.4	0.3	36.6
IE-06	2034	34.5	0.3	111.4
IE-06	2040	21.4	0.3	69.1
IE-06	2064	40.3	0.3	130.0
IE-06	2069	34.7	0.6	57.8
IE-06	2087	25.1	0.8	32.6
IE-06	2089	30.6	0.6	50.1
IE-06	2091	44.6	0.6	73.1
IE-06	2092	40.6	0.6	65.5
IE-06	2100	29.2	0.2	182.4
IE-06	2110	28.4	0.3	91.7
IE-06	2114	35.1	0.3	113.3
IE-06	2115	29.6	0.3	95.6
IE-06	2117	29.0	0.5	63.1
IE-06	2118	31.3	0.6	51.3
IE-06	2121	21.9	0.3	70.5
IE-06	2122	25.1	0.8	32.6
IE-06	2125	32.2	0.3	104.0
IE-06	2127	27.2	0.5	57.9
IE-06	2131	29.5	0.3	95.1
IE-06	2132	28.4	0.6	45.8
IE-06	2134	26.7	0.6	43.1
IE-06	2137	27.5	0.6	45.1
IE-06	2140	27.4	0.5	58.2
TOTAL:	130	4552.2	73.4	10296.0

Ratio of Averages: 62.0

Average Ratio: 79.2

TABLE 12
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-01	0314	24.1	0.4	61.7
TOTAL:	1	24.1	0.4	61.7

Ratio of Averages: 61.7

Average Ratio: 61.7

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-02	0528	23.8	4.9	4.8
IF-02	0529	31.2	1.9	16.5
IF-02	0531	24.4	3.0	8.2
TOTAL:	3	79.5	9.8	29.5

Ratio of Averages: 8.1

Average Ratio: 9.8

TABLE 12 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-03	0957	50.2	0.5	106.8
TOTAL:	1	50.2	0.5	106.8

Ratio of Averages: 106.8

Average Ratio: 106.8

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-04	0315	45.3	0.3	129.4
IF-04	0442	36.3	0.3	117.3
IF-04	0448	32.9	1.8	18.0
IF-04	0508	41.9	1.2	36.1
IF-04	0509	42.6	0.2	266.2
TOTAL:	5	199.1	3.8	567.0

Ratio of Averages: 52.2

Average Ratio: 113.4

TABLE 12 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-05	0312	46.4	2.4	19.0
IF-05	0313	23.5	4.4	5.3
IF-05	0444	47.2	0.4	107.2
IF-05	0445	26.6	0.9	31.0
IF-05	0447	29.4	0.9	33.0
IF-05	0474	49.0	1.9	26.3
IF-05	0476	31.5	0.2	196.7
IF-05	0479	26.4	0.8	31.8
IF-05	0480	29.6	1.4	22.0
IF-05	0481	25.0	1.9	13.2
IF-05	0482	19.9	5.8	3.4
IF-05	0485	28.7	3.4	8.5
IF-05	0486	25.4	4.1	6.3
IF-05	0491	22.6	0.2	141.4
IF-05	0492	34.8	1.0	35.1
IF-05	0493	29.2	2.1	14.1
IF-05	0681	20.3	4.4	4.6
TOTAL.	17	515.4	36.0	699.0

Ratio of Averages: 14.3

Average Ratio: 41.1

TABLE 12 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-06	0799	34.8	0.3	112.3
IF-06	0852	47.3	0.3	152.6
IF-06	0874	44.0	0.3	141.8
IF-06	0924	49.8	0.9	57.9
TOTAL:	4	175.9	1.8	464.7

Ratio of Averages: 98.3

Average Ratio: 116.2

TABLE 12 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-07	0267	49.0	0.5	106.5
IF-07	1063	48.5	0.4	131.2
IF-07	1064	37.9	2.0	19.5
IF-07	1065	26.0	2.4	10.7
IF-07	1067	46.4	1.3	35.2
IF-07	1068	50.4	0.3	162.5
IF-07	1069	34.5	1.5	22.6
IF-07	1070	43.0	0.4	116.4
IF-07	1071	32.1	1.8	17.5
IF-07	1089	37.6	2.5	15.2
IF-07	1090	26.0	1.2	21.1
IF-07	1091	47.3	0.3	152.6
IF-07	1092	35.4	2.5	14.2
IF-07	1094	47.4	3.0	15.9
IF-07	1097	38.0	2.1	17.8
IF-07	1099	44.0	4.0	11.1
IF-07	1100	26.0	4.3	6.1
TOTAL:	17	669.5	30.4	876.0

Ratio of Averages: 22.0

Average Ratio: 51.5

TABLE 12 cont'd
WASTE/COAL THICKNESS RATIOS
Willow Bunch Coalfield

Landscape Coal Zone

Surface Identification	Drillhole Number	Waste Thickness	Coal Thickness	Waste/Coal Ratio
IF-08	0900	50.4	0.3	162.5
IF-08	0901	23.9	0.3	76.9
IF-08	0903	37.9	1.3	28.7
IF-08	0905	48.2	1.6	29.8
IF-08	0909	37.9	2.1	17.7
IF-08	0910	49.5	1.2	40.2
IF-08	1015	47.3	1.5	32.4
IF-08	1076	44.9	1.6	27.2
IF-08	1096	44.6	1.5	29.3
TOTAL:	9	384.4	11.6	444.7

Ratio of Averages: 33.3

Average Ratio: 49.4

APPENDIX 2

EVALUATION CRITERIA

The following evaluation criteria were used in the estimation of the recoverable coal resources in the Willow Bunch Coalfield:

Mining Parameters

Coal specific gravity: 1.24, assuming 39% moisture and 13.5% ash.

Zone of Influence around an individual drillhole

Measured: < 0.4 km

Indicated: < 0.8 km

Inferred: > 0.8 < 1.6 km

Maximum mining depth : 50 meters

Recoverable Coal Thickness Restrictions

Minimum thickness of a single seam: 150 centimeters

Minimum thickness of a mineable seam : 45.7 centimeters

(with a loss of 22.8 centimeters on the top and 7.6 centimeters on the bottom)

Parting:

-cannot exceed a stripping ratio of 2:1 with respect to a coal seam beneath it.

-partings of 7.6 centimeters or more are to be removed.

Non-mineable Area Definitions

-Allowance of 30 meters is made to the crest of river valleys and to the back of underground mines or pits.

-Allowances of 100 meters from centreline of railroads and centreline of 230 and 138 kV power lines.

-Areas within town and airport limits.

Comments

Considering the scale at which the estimation of the recoverable coal was done the individual assessment of each narrow band of non-mineable area is not realistic. Instead 7% of the estimated total recoverable coal resources were deducted as coverage for all narrow negative areas, i.e., power lines , railroads , and highways. The average influence areas are tabulated on Table 13 to 18.

TABLE 13

AVERAGE AREA PER drillhole

Willowbunch Coalfield

Willow Bunch Coal Zone

Surface Identification	Number of drillhole	Total Area (km^2)	Area/Hole (km^2)
MA-13	13	8.50	.65
IA-01	27	60.50	2.24
IA-02	17	21.79	1.28
IA-03	23	25.03	1.09
IA-04	3	4.79	1.60
IA-05	2	4.30	2.15
IA-06	18	61.23	3.40
IA-07	18	49.81	2.77
IA-08	14	28.57	2.04
IA-09	1	1.56	1.56
IA-10	2	2.25	1.13
IA-11	1	1.93	1.93
IA-12	1	1 85	1.85
IA-14	13	18.85	1.45
IA-15	3	6.70	2.23
IA-16	2	3.55	1.78
IA-17	1	2.22	2.22
IA-18	2	4.73	2.37
NA-10	2	6.65	3.33
NA-11	1	6.93	6.93
NA-12	1	3.30	3.30
NA-15	3	6.33	2.11
NA-16	2	4.80	2.40
NA-17	1	2.52	2.52
NA-18	2	3.03	1.52

TABLE 14

AVERAGE AREA PER drillhole

Willowbunch Coalfield

Fremington Coal Zone

Surface Identification	Number of drillhole	Total Area (km^2)	Area/Hole (km^2)
IB-01	2	3.49	1.75
IB-02	1	1.98	1.98
IB-03	4	10.63	2.66
IB-04	7	14.61	2.09
IB-05	5	8.71	1.74
IB-06	6	11.22	1.87
IB-07	2	2.89	1.45
IB-08	10	17.07	1.71
IB-09	1	1.98	1.98
IB-10	1	1.56	1.56
IB-11	1	2.50	2.50
NB-01	2	16.75	8.38
NB-02	1	1.81	1.81
NB-07	2	4.15	2.08
NB-08	10	4.54	.45
NB-09	1	2.38	2.38
NB-10	1	2.55	2.55
NB-11	1	13.00	13.00

TABLE 15

AVERAGE AREA PER drillhole

Willowbunch Coalfield

Coronach Coal Zone

Surface Identification	Number of drillhole	Total Area (km^2)	Area/Hole (km^2)
MC-05	125	13.49	.11
IC-01	7	14.74	2.11
IC-02	4	7.61	1.90
IC-03	1	2.56	2.56
IC-04	5	9.53	1.91
IC-05	125	67.69	.54
NC-02	4	17.96	4.49
NC-03	1	8.03	8.03
NC-04	5	23.22	4.64

TABLE 16

AVERAGE AREA PER drillhole

Willowbunch Coalfield

Hart Coal Zone

Surface Identification	Number of drillhole	Total Area (km^2)	Area/Hole (km^2)
MD-05	502	111.07	.22
ID-01	9	16.42	1.82
ID-02	10	24.59	2.46
ID-03	1	2.56	2.56
ID-04	4	2.56	.64
ID-05	502	103.65	.21
ID-06	3	7.52	2.51
ID-07	18	44.53	2.47
ID-08	2	3.58	1.79
ND-01	9	27.99	3.11
ND-02	10	52.67	5.27
ND-03	1	12.02	12.02
ND-04	4	11.92	2.98
ND-05	502	108.03	.22
ND-06	3	9.45	3.15
ND-07	18	49.15	2.73
ND-08	2	8.84	4.42

TABLE 17

AVERAGE AREA PER drillhole

Willowbunch Coalfield

Fife Lake Coal Zone

Surface Identification	Number of drillhole	Total Area (km^2)	Area/Hole (km^2)
ME-06	130	61.46	.47
IE-01	4	18.76	4.69
IE-03	4	11.66	2.92
IE-04	1	2.50	2.50
IE-05	5	40.10	8.02
IE-06	130	120.14	.92
NE-01	4	63.26	15.82
NE-03	4	26.69	6.67
NE-04	1	6.30	6.30

TABLE 18

AVERAGE AREA PER drillhole

Willowbunch Coalfield

Landscape Coal Zone

Surface Identification	Number of drillhole	Total Area (km^2)	Area/Hole (km^2)
IF-01	1	2.56	2.56
IF-02	3	7.28	2.43
IF-03	1	2.56	2.56
IF-04	5	10.24	2.05
IF-05	17	44.97	2.65
IF-06	4	10.24	2.56
IF-07	17	44.32	2.61
IF-08	9	25.17	2.80
NF-01	1	12.24	12.24
NF-02	3	23.88	7.96
NF-03	1	5.76	5.76
NF-04	5	79.11	15.82
NF-05	17	107.11	6.30
NF-06	4	71.11	17.78

MAPS NOT

FILMED

CARTES

OMISES